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# **A PLAN FOR PROTECTING, ENHANCING, AND INCREASING CALIFORNIA'S WETLANDS FOR WATERFOWL**



**State of California  
The Resources Agency  
Department of Fish & Game**

**H. D. Carper, Director**

**November 1983**

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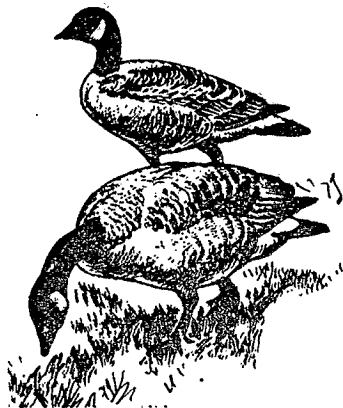
H. D. Carper  
Director

# TABLE OF CONTENTS

	Page
I. SUMMARY AND GENERAL RECOMMENDATION.....	1
II. CONCLUSIONS AND RECOMMENDATIONS.....	5
III. INTRODUCTION.....	9
IV. PAST.....	11
A. Wetlands History.....	11
B. History of Waterfowl Resource and Efforts to Maintain It.....	20
V. PRESENT STATUS OF SIGNIFICANT WATERFOWL WINTERING AREAS.....	31
A. Coastal Wetlands.....	31
B. Great Basin.....	33
C. Central Valley.....	34
D. Salton Sea and Colorado River.....	37
VI. THREATS TO WETLANDS AND WATERFOWL.....	39
A. Public Wetlands.....	39
B. Private Wetlands.....	39
C. Agricultural Crops Utilized by Waterfowl.....	39
D. Water Sources.....	40
VII. PROPOSED PROGRAM FOR WETLANDS AND WATERFOWL.....	41
A. Conservation Easements.....	41
B. Protecting Agricultural Waste Grain For Waterfowl.....	41
C. Water for Waterfowl and Wetlands.....	44
D. Using Wastewater to Create Wetlands.....	44
E. Accelerated Wetlands and Waterfowl Research.....	44
VIII. NEW FUNDING.....	45
IX. NEW WETLANDS.....	47
X. ADDITIONAL OPTIONS AND CONSIDERATIONS.....	51

APPENDIX

- A. Senate Concurrent Resolution No. 28
- B. SCR 28 Task Force
- C. Proposed Legislation



Cover Photo - Wildlife at Gray Lodge Wildlife Area. Photo by John B. Cowan.

## I. SUMMARY

Concern for the future of waterfowl and associated wildlife dependent on wetland resources in face of a continuing loss of wetland habitat in the State resulted in legislation, Senate Concurrent Resolution No. 28, introduced by Senator Barry Keene in 1979. SCR 28 requested the Department of Fish and Game to prepare a plan to reverse the trend of converting important waterfowl wetlands to other land uses, improve the value of existing wetlands for wintering waterfowl and increase the amount of wetlands by 50 percent.

California's wetlands are of significant value to the people of the State. They furnish essential habitat for waterfowl and a wide variety of wildlife. They also provide benefits such as open space, flood water dissipation, groundwater recharge, oxygen production, improved water quality, nutrients for fish and wildlife and recreational opportunities.

Over 90% of California's historical 2 to 5 million acres of natural wetland have been lost to conversion to other land uses. Some conversions have retained some important seasonal wetland values, other conversions have permanently eliminated all vestiges of wetland habitat. The natural condition for virtually all wetlands in the Central Valley has been eliminated, yet large numbers of ducks, geese and other wetland associated wildlife continue to occur in the State. The conversion of these historic natural wetlands to agriculture has forced waterfowl to be dependent to a major extent upon cultivated crops for food and about 240,000 acres of modified wetlands. Most of these modified wetlands, located in the Central Valley, are managed to provide essential food and resting places for waterfowl to perpetuate the survival of these resources. These areas also serve to divert and prevent crop depredation by waterfowl. These wetlands are developed and maintained at considerable expense. Costs are shared by the Department of Fish and Game with funding from the license buyer, the U.S. Fish and Wildlife Service, private duck clubs, and other landowners. In recent years, there has occurred a continuing serious loss of these modified wetlands, primarily on privately owned areas maintained for waterfowl hunting. In some instances, the owners have sold to others who have converted the land to intensive agricultural production. In other cases, owners have attempted to defray the high costs of operation by leasing all or part of their holdings to crop production with fields being reflooded for waterfowl hunting after harvest. This results in poorer quality habitat for all species of waterfowl.

Although loss of wetlands to rice production has had a negative impact on waterfowl and other associated wildlife, it does provide a source of food that is critical for waterfowl under present conditions. This dependence of certain species of waterfowl on rice necessitates the adoption of incentives to encourage growers to maintain their lands in an optimal condition for wintering waterfowl. Future technological advances in machinery and plant genetics could allow greater efficiency in production and more flexibility in types of crops grown. This would result in the loss of cereal grain crops now important for wintering waterfowl.

In order to understand the total impact of man's progress on waterfowl resources of the State, we must look further than the loss of natural wetlands, and the development of substitute or man-made wetlands, or crops such as rice that provide considerable habitat for wintering birds. Examination must also be made of impacts of recent land use changes on the vast acreages of relatively undeveloped private land used extensively by waterfowl when conditions were favorable. These changes included the development of range and pasture lands, agricultural and recreational development of flood plains, and conversion from low to intensive agricultural production. Other problems of high property taxes, high water pumping and transportation costs and unavailability of a dependable water supply must also be addressed.

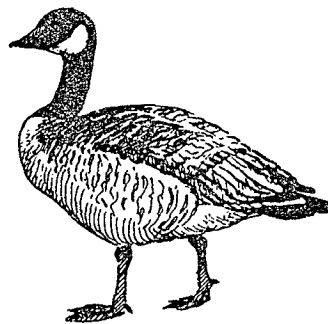
The last major links of essential habitat in California for the migratory waterfowl of the Pacific Flyway continue to diminish. The coastal wetlands have suffered in terms of permanent losses. Development for high priced subdivisions and marinas have virtually eliminated 90% of coastal wetland habitat in southern California. The original statewide estimate of 381,000 acres of coastal wetlands has been reduced approximately 70 percent to 170,000 acres by dike and fill operations for agriculture, urban, residential, industrial developments and salt production. Upstream diversions of freshwater from coastal streams have resulted in even greater reductions in fresh and brackish water marshes. Waterfowl historically were found in huge numbers along the coast, today less than 5% of the Pacific Flyway's wintering waterfowl utilize this area. However, certain species are dependent on coastal wetlands for a major portion of their wintering habitat requirements. A number of endangered species are also dependent on this habitat. For the puddle ducks using the coastal wetlands, fresh and brackish are the most valuable habitat of the coastal wetland types.

Existing State and Federal laws and regulations provide substantial protection to the remaining coastal tidal wetlands from further conversions. However, recent State and Federal legislative and regulatory proposals have sought to significantly diminish the authority of the State Coastal Commission and the U.S. Corps of Engineers to protect coastal wetland areas.

There are a number of opportunities to increase the amount of modified natural wetlands in the State such as enlarging existing wildlife areas and using agricultural and municipal wastewater to create new areas. Incentives recommended to encourage owners of existing wetlands to maintain and enhance these areas will encourage the development of new wetlands on marginal agricultural lands by private interests. Mitigation and habitat compensation measures for unavoidable losses caused by permitted projects could also result in the restoration of degraded wetland areas or the creation of new ones.

Preservation, restoration, enhancement and creation of new wetlands is expensive. The extent to which this can be accomplished depends on the commitment of money and human resources. Not only are acquisition and development funds required, but adequate long-term annual operational funds must also be provided.

No set formula is proposed for prioritizing the various elements of the suggested wetlands program. However, we believe the general approach that should be followed is to first protect existing wetlands, second to improve the value of existing wetlands for wildlife and third to acquire and develop new wetlands. This would mean that wherever feasible initial efforts should be made to maintain existing private and publicly-owned wetlands. It does not mean that if the opportunity arose to purchase and develop new wetlands that this should not be considered until all aspects of existing wetland protection and improvement programs were in place. In the recommendations that are made for legislative action there are several elements that are common to the three major features of the suggested wetland program. For example, elements such as water supply and operating and development expenses are an integral part of maintaining both new and existing wetlands. In some instances the recommendations developed pertained to both existing and new wetlands without priority given to either one. Also, the conservation easement program recommended would satisfy the needs for both preservation and enhancement of existing wetlands and encourage development of new wetlands.



# Cost Estimates of Implementing S.C.R. 28 Recommendations

## 1. Protecting Existing Wetlands

### Capital Costs

Purchase of conservation easements on private wetlands @ \$1,000/acre	\$100 million
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Reimbursement of counties for property tax exemptions on private wetlands	<u>\$1.5 million</u>
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Total	\$101.5 million
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## 2. Enhancing Existing Wetlands

### Capital Costs

Development cost of improving State-owned wetlands	\$10 million
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### Annual Costs

Added costs of maintain existing wetlands at their optimum value	<u>\$2 million</u>
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Total	\$12 million
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## 3. Developing New Wetlands

### Capital Costs

*Cost of acquiring 120,000 acres for wetland development to increase wetlands by 50% @ \$2,000/acre	\$240 million
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*Development of new wetlands @ \$1,000/acre	\$120 million
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### Annual Costs

In lieu property tax for new wetlands	\$1.5 million
---------------------------------------	---------------

Operation and maintenance of new wetlands	<u>\$6 million</u>
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Total	\$367.5 million
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Grand Total	\$481 million
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\*Acquisition, development, and operational costs could be substantially reduced by development of new wetlands in conjunction with other public projects.



## II. CONCLUSIONS AND RECOMMENDATIONS

- A. Increasing economic pressure to intensify the use of land will result in an accelerated loss of wetlands on private property. Duck clubs will continue to be sold for more intensive uses or partially or totally converted to agricultural production.

Legislative actions recommended to reduce the projected loss of remaining private wetlands:

1. Adopt and fund a wetland conservation easement program administered by the Department of Fish and Game, independent of the Fish and Game Preservation Fund, which includes tax incentives for lands under easement.
  2. Require County Assessors to apply the lowest assessment rates to wetlands that are flooded for waterfowl between October and the end of February or longer.
  3. Provide State tax credits for wetland owners who develop new or improve existing wetlands for wintering waterfowl.
  4. Retain the existing provisions of the State Coastal Act for the protection and restoration of coastal wetlands.
  5. Require delivery of water through the end of January as a condition of new or renewed water contracts made by the Department of Water Resources when modified natural wetlands are in the delivery area.
  6. Seek Federal legislation to require the same conditions in U.S. Bureau of Reclamation Contracts.
- B. Private wetland losses will continue even with an aggressive program to protect existing wetlands. New wetlands must be developed to offset this loss.

Legislative actions recommended to acquire and develop new wetlands:

1. An annual appropriation to the Wildlife Restoration Fund or General Obligation Bond Act for enlargement of existing wetland areas and purchase of new areas on an opportunity basis subject to willing sellers.
2. Provide for long-term, interest-free loans or grants to sanitation districts to acquire land to create and maintain wetlands with wastewater.
3. Provide State tax credits for wetland owners who develop new wetlands for wintering waterfowl.
4. Require water districts which receive SWP and CVP water to manage groundwater recharge basins in a manner which favors waterfowl.

5. Seek Federal legislation which requires that benefits to wetland dependent wildlife be given greater consideration in the process of determining eligibility for Federal subsidy programs such as the Payment In Kind (PIK) program and the Clean Water Act grants.
- C. Funding sources available to the Department of Fish and Game for operation of wetlands in State ownership are inadequate to maintain existing wetlands, much less operate new areas. New sources of funds are needed to better manage existing areas and develop and operate new wetlands.

Legislative actions recommended to fund development and operation of new and existing wetlands in State ownership.

1. An annual appropriation to the Fish and Game Preservation Fund to pay for the benefits public wetlands provide agriculture in relief of crop depredation.
  2. An annual appropriation to the Fish and Game Preservation Fund for wetland operation and maintenance, based on the ratio of nonappropriative users to appropriative users.
  3. Place an initiative before voters for adoption of a sales tax increase, the proceeds to be used for acquisition, development and operation of Department of Fish and Game's wetlands and other fish and wildlife programs, including rare and endangered. If approved, recommendations C.1 and C.2 would not be needed.
- D. Wintering waterfowl in the Sacramento Valley depend on waste rice and oth grain for a substantial portion of their food requirements. Loss of this food source would have a major impact on some species of waterfowl.

Legislative actions recommended to assure a continuing source of waste grain for wintering waterfowl.

1. Establish a priority for fall burning permits for rice growers who reflood for waterfowl or agree not to plow fields until mid-March.
  2. Require County Assessors to apply reduced assessment rates to agricultural lands that are flooded for waterfowl between October and the end of February.
- E. Additional water supplies are needed to protect existing wetlands and to develop new wetlands.

Legislative actions recommended to secure new water for wetlands:

1. Require that a portion of the yield of water and electrical power from all new reservoirs constructed by the State, be allocated to fish and wildlife resource management.

2. Authorize the State to participate with the Federal government in a San Joaquin Valley drainage program which will restore wetlands to the San Joaquin Valley by utilizing drain water.
  3. Establish a multiagency task force to develop and implement a program to manage the natural resources of the Salton Sea area to stabilize the sea's salinity and water elevation at a level that will sustain the area's fish and wildlife resources and permit the use of agricultural drain water to create new wetlands.
  4. Provide preservation and enhancement for fish and wildlife in any legislation governing water resources.
  5. Seek Federal legislation that would provide preferred customer status electrical power to pump ground water for maintenance of public and private wetlands.
  6. Seek Federal legislation to authorize the U.S. Bureau of Reclamation to upgrade to Class 1 status all existing user contracts for the delivery of water to a wetland.
  7. Direct the Department of Water Resources and the State Water Resources Control Board to develop statewide water conservation guidelines which recognize and protect the contribution of agricultural return and drainage water in the maintenance of wetlands.
  8. Authorize the transport of water for wetlands through the State Water Project as a General Fund obligation and seek Federal legislation to do the same for the Central Valley Project.
  9. Direct that the Department of Water Resources work with the Department of Fish and Game to develop plans and means to conjunctively use water during drought years.
  10. Institute a program to use excess water in the Colorado River during times of flood releases to create new temporary wetlands.
- F. Additional research is needed on wetlands and waterfowl which require funding from sources other than those currently available to the Department.

Legislative action recommended to fund research program:

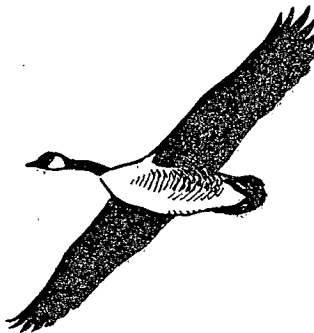
1. Provide an annual appropriation from a special fund such as the Energy and Resources Fund especially for waterfowl and wetland research.
- G. A potential exists for creating new wetlands with wastewater if sanitation districts receive encouragement from Congress and the California Legislature in the form of policy and funding for land acquisition.

Legislative action recommended:

1. Establish authority for sanitation districts to receive grants or no/low interest loans to acquire and/or develop land for creation of new wetlands with wastewater.
  2. Establish a State interagency board to assist sanitation districts in creating new wetlands with treated wastewater and to evaluate and resolve public health concerns and submit its recommendations to the State Water Resources Control Board for evaluation and implementation.
  3. Seek Federal legislation to allow the Environmental Protection Agency to make grants to sanitation districts to acquire and develop land for wetlands.
- H. The actions recommended above need continuing direction in a coordinated manner to develop an effective implementation program.

Legislative action recommended:

1. Enact legislation with the appropriate funding support, directing the Department of Fish and Game to develop and implement a comprehensive program to protect, enhance and increase wetlands in California.



### III. INTRODUCTION

The annual migration of waterfowl into California, when 8 to 10 million birds migrate through or winter in the State, represents one of the most spectacular migrations occurring in North America. The waterfowl migrating through or wintering in the state comprise over 60 percent of the Pacific flyway population and 18 percent of the entire continental wintering waterfowl population. Several species such as tule white-fronted goose, cackling goose, Ross' goose, and Aleutian Canada goose are unique because almost the entire population winters in California.

Concern for the future of these resources in the face of continuing loss of wetland habitat in the State resulted in legislation, Senate Concurrent Resolution No. 28 (Appendix I), introduced by Senator Barry Keene in 1979. SCR 28 requested the Department of Fish and Game to prepare a plan to reverse the trend of converting important waterfowl wetlands to other land uses, improve the value of existing wetlands for wintering waterfowl and increase the amount of wetlands by 50 percent.

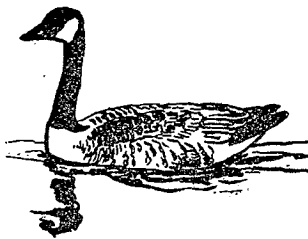
To obtain information for the plan, the Department surveyed owners of private wetlands to determine the type and magnitude of problems they are facing. Wetland preservation programs of other states were reviewed to determine the applicability for California. The California Department of Water Resources provided general information regarding water supplies for major wetland areas. To assist identification of areas of conflict that would impede implementation of recommendations and to obtain data for preparation of the plan, a task force was appointed. The members represented water and agricultural interests, user groups and State and Federal regulatory agencies (Appendix II). A review of the literature was made to analyze what has happened to California's wetlands and waterfowl populations, and what actions have been recommended and/or implemented. This information provides the historical basis and support for the recommendations contained in this plan.

In accordance with SCR 28's directives, this plan concentrates on protecting, enhancing and increasing those wetlands of major importance to wintering waterfowl.

California's wetlands provide extensive benefits to the people of the state. They furnish essential habitat for a wide variety of wildlife. They also provide benefits such as open space, flood water dissipation, ground water recharge, oxygen production, improved water quality, nutrients for fish and recreational opportunities. The plan identifies the major wetland areas in California that are important to wintering waterfowl of the Pacific Flyway and other wildlife dependent on wetland habitat. It also describes the problems which are adversely affecting these wetlands. Actions are suggested to preserve and enhance existing wetlands, restore former wetlands where feasible and create new wetlands. Recommendations suggested for optimizing wetlands for wintering waterfowl also will provide substantial benefits for many other species of wildlife in addition to enhancing the other values attributed to wetlands. The plan also discusses the contribution of undeveloped lands which provide seasonal habitat for waterfowl and which are rapidly being converted to intensive uses.

The list of areas where wetlands can be restored or new wetlands created is general because of the need for flexibility. Flexibility is necessary when lands are acquired from willing sellers as opposed to the use of eminent domain, where a specific site is identified, authorized and condemnation proceedings initiated.

The emphasis in this plan is on interior wetlands since over 95 percent of the wintering waterfowl use in California is on these wetlands. However, coastal wetlands need the continued attention of the Legislature to assure that existing state authority continues to effectively cause protection and restoration of this habitat for species of waterfowl and other wildlife.



#### IV. PAST

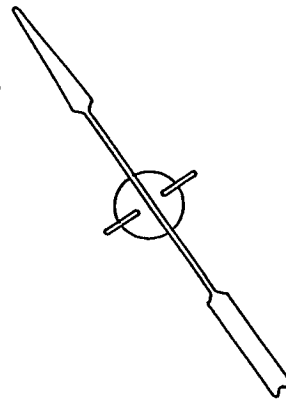
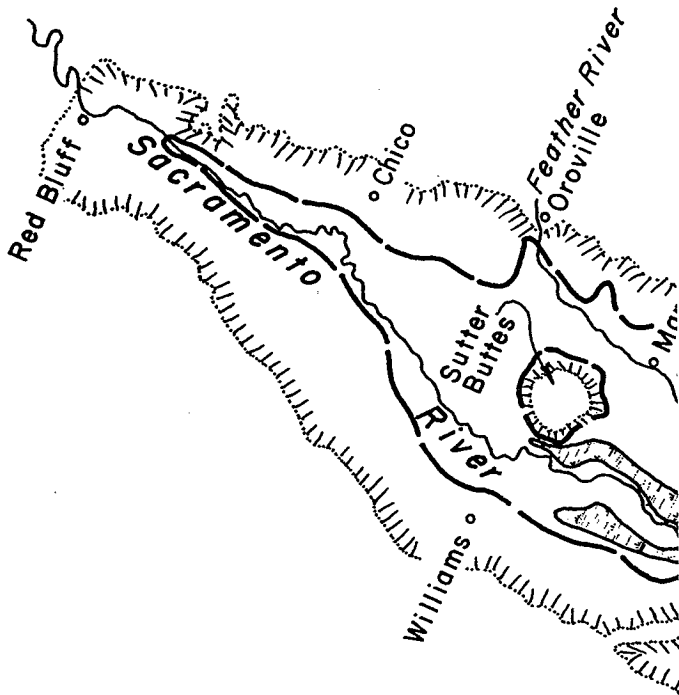
##### A. CALIFORNIA WETLAND HISTORY

Substantial differences exist in the estimates of the total acreage of wetlands occurring in California prior to settlement by Europeans in the 19th century. Six million acres of wetlands were estimated by Horn and Glasgow (Linduska 1964). Five million acres were reported in Waterfowl of California (Kozlik 1974); and 3.5 million acres were estimated in 1954 by the U.S. Fish and Wildlife Service according to a publication introducing wetlands conservation legislation H.R. 4680. Lack of authentic records makes accurate identification of historic wetland habitats in California difficult (DWR Bul. 29). Discrepancies in estimates of original wetlands are also caused by the lack of a concise definition of wetlands and the large number of environmental conditions that may be included under the definition of a wetland. Recently, however, the U.S. Fish and Wildlife Service has attempted to standardize the classification of wetlands by developing a clear definition and classification system (Cowardin, et al. 1979). Several hundred different habitat types can be classified using this system, and the Service has begun a nationwide National Wetlands Inventory and large areas of California have been mapped. The data for California is not complete nor has it been summarized.

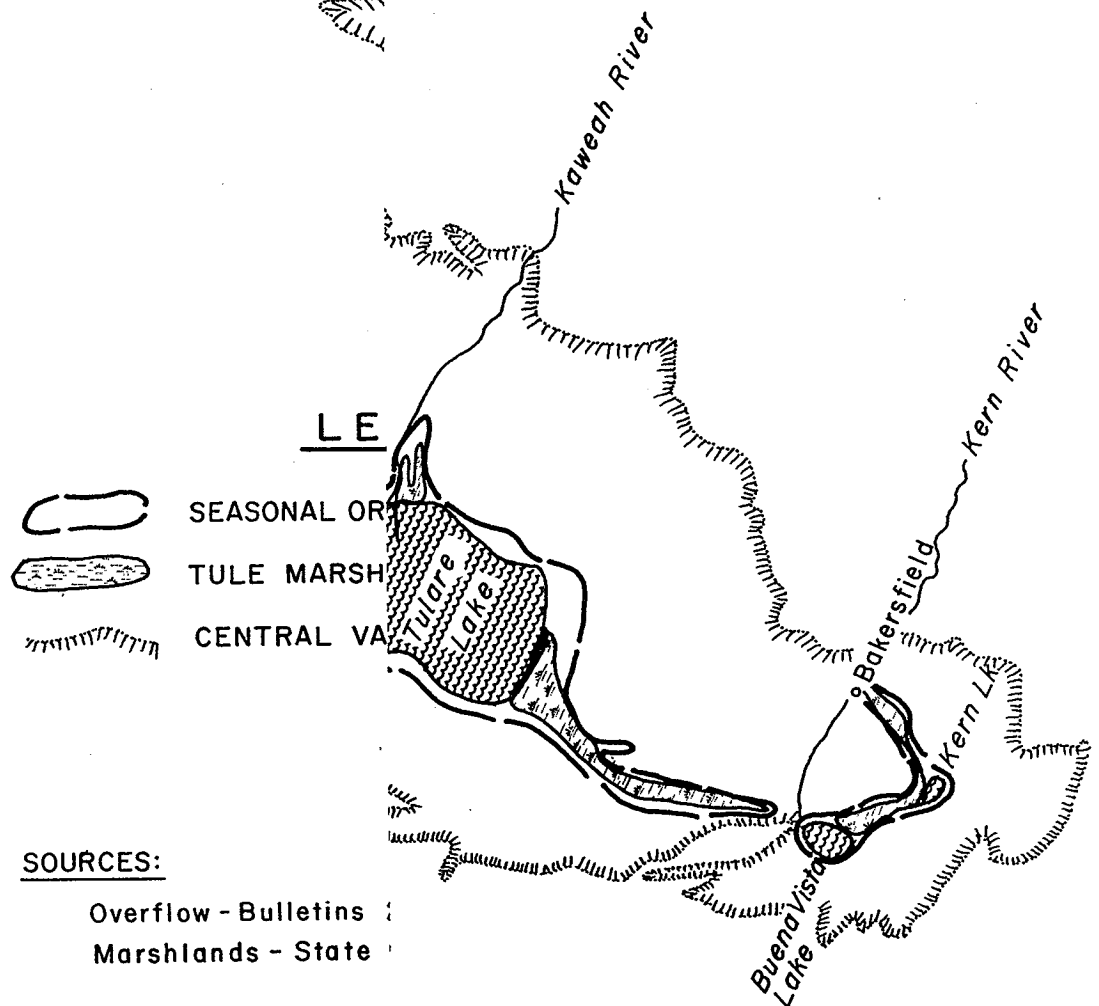
The State originally contained an estimated 500,000 acres of permanent freshwater marshes (Kahrl 1979). The major fresh and brackish marshes or tulelands were located along the borders of San Francisco, San Pablo and Suisun bays and Tulare and Kern lakes and in basins along the Sacramento and San Joaquin rivers (Hittel 1863) (Figure 1). Additional, extensive acreages were flooded for varying periods each year beginning with the winter rains and continuing through the spring thaw and runoff. The amount and duration of these seasonal wetlands varied from a few days to several months, depending on timing and magnitude of storms and snow pack (DWR Bul. 29). These seasonally flooded lands together with the tulelands were granted to the state as "Swamp and Overflow Lands" under the authority of the Arkansas Swamp Act of 1850. Identification of the swamp and overflow lands caused considerable disagreement between the State and Federal government, as Federal surveys were made during the summer after the water had receded and described a much smaller area than the State government believed existed. On December 5, 1871, the Secretary of the Interior finally accepted the State's reported "liberal" determination of 2,192,506 acres (Thompson 1957).

Coastal wetlands, which included tidal salt marshes, mud flats, tidal channels, lagoons and small bays, originally consisted of 381,000 acres; today only 170,000 acres remain (U.S. Fish and Wildlife Service 1979).

Vernal pools are another wetland habitat type used by wintering waterfowl that has been greatly diminished by land leveling for agricultural production. The amount of this habitat that existed before settlement of the state or the amount that remains today is unknown.



SCALE: 1" = 25 MI.



SOURCES:

Overflow - Bulletins  
Marshlands - State

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Even more difficult than accurately quantifying original wetlands types is assessing their relative value to historic waterfowl resources. Early accounts of waterfowl in the State refer to extensive use by ducks and geese of wetland types that presently receive only light use. Less than 5 percent of the Pacific Flyway's waterfowl now use coastal wetlands, (USFWS Ibid). Historically, wigeon were reported being found in large numbers of salt marshes and tidal overflows and even formed great dark patches on the ocean a mile or so beyond the surf, (Payne 1908). An early California botanist, Archibald Menzies, in the fall of 1792, reported a great abundance of ducks and geese on the saltwater lagoons he visited adjacent to both Monterey and San Francisco bays (Menzies 1924).

The dense stands of tules like those which historically comprised a substantial portion of the Central Valley's permanent natural wetlands are not considered high quality waterfowl habitat (Linduska 1964). The usable waterfowl habitat in these historic tulelands was primarily open water containing aquatic submergent vegetation that occurred in the form of ponds, sloughs and rivers mixed in with the thick stands of tules.

#### Sacramento - San Joaquin Delta Changes

Reclamation of the Sacramento-San Joaquin Delta began in the 1860's and was nearly completed by 1920 (Thompson 1957). Initial reclamation in the Delta consisted of constructing low levees to exclude the high tides, then burning the dense stands of tules that died from lack of tidal inundation. The ash was then seeded with wheat, and irrigated through tide gates. Approximately one half of the Delta wetlands had been reclaimed by 1900 (Kahri 1979).

Early accounts of waterfowl and waterfowl hunting indicating that the Sacramento-San Joaquin Delta area was one of the most important--if not the most important--area of the State for waterfowl. Today native plants considered the most important food for waterfowl have essentially all disappeared. This significant food loss is attributed to damming and filling of sloughs and ponds in conjunction with reclamation, introduction of carp and to the covering of beds of aquatic plants with mining debris, and the deepening of remaining channels by removing soil to construct and reconstruct larger levees.

On December 16, 1888, the San Francisco Daily Examiner described the decline of canvasback hunting in the Sacramento-San Joaquin Delta when the beds of "Vallisneria" were covered with mining debris. Hedderly (1910), describing canvasback hunting in southern California mountain lakes, indicated that "Vallisneria is the key to canvasback shooting and that these ducks are never plentiful where the plant is not found growing." Other early accounts of canvasback hunting in California also associated canvasbacks with an eastern plant they called "Vallisneria" which was probably sago pond weed, Potamogeton pectinatus, a native California plant. Sago pond weed was reported to be by far the most important food plant of the Suisun Marsh for pintail and canvasback ducks. Canvasback were especially fond of the tubers. However, efforts to control mosquitos resulted in water management practices unsuitable for production of many duck foods such as pond weeds (Mofitt 1938).

Sago pondweed has not reestablished in the Delta nor does it seem to be as abundant elsewhere as early authors reported. The introduction and wide distribution of carp into California waters during the 1870's and 1880's may have contributed to pond weed not reestablishing.

Destruction of natural aquatic waterfowl food plants by carp was reported to have occurred in 1911 (Cummings and Dunn). At that time it was written that "fifteen years ago fresh water plants were very plentiful and waterfowl did their feeding in the marshes, now the birds take to the stubble fields for feeding grounds". Carp have also been reported to destroy waterfowl habitat and food plants, in the central and eastern United States (Linduska 1964). Also, the development and use of dredges for levee reconstruction may have deepened the channels and sloughs beyond the depth requirements for this plant. Combined, these factors have essentially eliminated the Delta's ability to produce aquatic waterfowl foods at historic levels. Currently, nearly all the waterfowl in this part of the State must utilize agricultural crop residues for food.

#### Sacramento Valley Changes

During the early period of settlement, agriculture in the Sacramento Valley consisted largely of grain and cattle production (DWR Bul. 26). These agricultural efforts were not seriously affected by periodic winter flooding but when flooded, provided excellent waterfowl habitat. Non-irrigated wheat production began in the Central Valley during the crop year 1866-67 and quickly replaced cattle as the State's leading agricultural commodity until collapsing at the end of the century (Kahrl 1979). More intensive forms of agriculture usually followed flood protection and development of irrigation, with orchards and rice becoming the major crops (DWR Bul. 26). In the Sacramento Valley the higher and more fertile lands adjacent to the river were the first to be settled and protected with levees (DWR Ibid).

Table 1

#### Completion of Reclamation for Sacramento Valley Flood Basin

<u>Basin</u>	<u>Year Completed</u>
Sacramento	1931
American	1915
Yolo	1920
Colusa	1916
Sutter*	1919
Butte	Not protected

\*Most of basin protected

Engineering data presented at the "Antioch Suit" in 1920 demonstrated that in normal or wet years the flood basins of the Sacramento Valley gradually drained in the late spring and early summer. Based on data from the period 1907-1920, a

considerable quantity of water was contributed to the river from these wetlands in June, a relatively smaller quantity in July, and none in August (DWR Bul. No. 27).

Reclamation along the rivers of the Sacramento Valley and in the Sacramento-San Joaquin Delta was hampered by frequent flooding (Kahrl 1979). Flooding was compounded by unregulated construction of levees which reduced the flood plain volume, and by alluviation of the channels from mining debris. Alluviation in the Sacramento River became so severe between 1860 and 1914 that many of the channels in the Sacramento-San Joaquin delta became choked and narrowed by the debris, and their beds were raised as much as 15 feet. The bed of the Yuba River spread to a width of two miles and had raised 20 feet where it joined the Feather River, while the Feather River pushed up an underwater dam that backflooded the Sacramento River beyond Colusa (Kahrl Ibid).

During 40 years of independent reclamation beginning in the 1860's, three or more post reclamation drainings were required (DWR Bul. 27). Reflooding of these reclaimed agricultural lands often resulted in re-creation of excellent waterfowl habitat. Walter Welch (1931) wrote of a market hunting trip in 1879, "When we arrived at the river (Sacramento) we found that the levees had been broken by the high water of the previous year, and that the whole country known as 'Yolo Basin' and the 'Delta section' had been overflowed....As the conditions were ideal for waterfowl of all species, the country was alive with thousands -- yes, millions of ducks, geese and every variety of shore birds".

The greatest impacts on the historic wetlands and on the ability of early agriculture to support wintering waterfowl in the State resulted from federally mandated programs. The first legislative act to have a significant effect on wetlands was passed by the 31st Congress, three weeks after California was admitted to the Union. The Arkansas Swamp Act of September 28, 1850 granted to California and various other states all the federally owned swamp and overflow lands that were unfit for cultivation (Chapter 85, 31st Congress). The Act provided that the states must use proceeds from sale of these lands for construction of levees and drains, to reclaim the land for cultivation. The states made a very liberal interpretation of overflow lands, and considerable acreage was included that was overflowed only for short periods during the rainy season. Some lands included as Swamp and Overflow even contained irrigation systems (Thompson 1957). By 1878, 2,000,000 acres of swamp and overflow lands were sold, but only one-sixth were reclaimed. Ultimately, California received 2,192,506 acres of swamp and overflow lands from the federal government.

On March 1, 1893, the California Debris Commission (Corps of Engineers) was created by Congress to make a survey and plan for the control of floods and improvement of channels in the Central Valley. In 1911 the Debris Commission's plan was adopted by the State Legislature and the Reclamation Board was established to regulate private levee building. The United States Congress adopted the Debris Commission's plan in 1917. However, in 1913, dredges had been put to work in the Sacramento River to remove mining debris. By 1927, the river had returned to the original elevation at the City of Sacramento. The federal government took over the cost of levee building under the 1928 Flood Control Act, due to the inability of private and state government to finance construction

following the slump in farm prices after World War I. Finally, in the 1930's the Bureau of Reclamation's Central Valley Project started constructing reservoirs which helped hold back flood waters. By 1944 the Sacramento Valley Flood Control Project was brought to near completion with 980 miles of levees, 7 weirs, 438 miles of channels and canals, and 7 bypasses, 95 miles in length (Kahrl 1979).

#### San Joaquin Valley Changes

In the San Joaquin Valley, where seasonal overflow was not as extensive as in the Sacramento Valley, and low annual rainfall limited non-irrigated agricultural production, development of irrigation systems began at an earlier date.

Irrigation began in the decade following 1850 when diversions were made to lands adjacent to streams (DWR Bul. 29). Construction of the railroad through the valley during the period 1869 to 1875 resulted in increased population and greater demand for water to irrigate additional lands. Use of water on the higher lands resulted in lesser amounts going into the lower wetlands areas which dried and were then used for agriculture. Portions of Buena Vista and Tulare lakes were leveed and used partially for water storage for irrigation while the remainder of the lake beds was farmed.

The first large irrigation canal in the San Joaquin Valley, the San Joaquin and Kings River Canal, started operation in 1871 and was the first of a number of canals built by Miller and Lux, a major land holding corporation. By 1890, almost all of the major irrigation systems taking water from tributaries of the San Joaquin River had been started. On the main stem of the San Joaquin River, most of the development between the community of Patterson and the Delta was carried out after 1915.

Fortunately for waterfowl, even with the loss of essentially all of the natural wetlands, some irrigation practices and crops grown in the Central Valley have helped offset loss of some of the natural wetlands values. Another major contribution to the survival of waterfowl wintering in California was the early efforts of sport hunters to acquire lands not suited for growing crops and to develop and maintain these lands for waterfowl hunting during the fall and winter. Controversy exists as to when the first duck club was formed (McAllister 1930, Stoner 1937 and Welch 1931). Stoner reported the Hardland Club, organized in 1879 with 10 members in the Suisun Marsh, was the first club. McAllister wrote that the Cordelia Shooting Club in the Suisun Marsh was a first club, established in 1880. Welch referred to a market hunter who rented an island near Rio Vista for duck hunting purposes. He wrote that subsequently, duck preserves began to spring up in the Suisun Marsh and elsewhere throughout the State.

An article in the December 16, 1888, San Francisco Examiner reported that the Teal Club on the Suisun Marsh was the most expensive club. It doubted if a share could be had for less than \$1,000, and annual expenses were \$300. The year 1910 may have been the peak period for gun clubs in the San Francisco Bay and Los Angeles areas, the latter being called the "Capital of Duck Clubs in America" by Edwin Hedderly in Western Field (September 1910). The oldest club in the Los Angeles area, established in 1887 on the Ballona Marsh, was the Recreation Gun Club. Grinnell attributed the establishment of gun clubs to the scarcity of birds. Clubs were operated primarily to attract birds to the gun.

A January 1929 survey of duck clubs in California conducted by the United States Department of Agriculture listed 195 clubs, with a total of over 155,600 acres and an average size of 806 acres. Information was not collected regarding the percent of those duck club lands under cultivation. In 1959 the Department of Fish and Game surveyed duck clubs and found the number of clubs had increased to approximately 1,000 controlling 330,000 acres of land, of which 175,000 were flooded either seasonally or permanently. Club size had decreased to an average of 330 acres controlled or 175 acres flooded per club, and 11 percent of the club lands were used to produce cultivated crops. The last survey of duck clubs made by the Department of Fish and Game was conducted in 1975. The acreage controlled by 1,062 clubs had increased to 453,704, of which 279,253 were flooded seasonally or permanently. The amount of clublands being farmed was 211,843 acres, an increase of 47 percent and the amount of modified natural wetlands was 137,253 acres. This most recent survey did not include an estimated 100,000 acres of flooded grain fields in the Sacramento-San Joaquin Delta flooded for leaching, weed control and waterfowl hunting.

In 1981 the Department sent questionnaires to duck clubs owners who indicated in the 1975 survey that they were operating on natural vegetation or uncultivated lands. The questionnaire was designed to find out what kinds of problems they faced which resulted in clubs being converted to agriculture or other uses. Results of the questionnaire indicated that the problems affecting private wetland owners varied from area to area (Table 2) i.e., ducks rafting on adjacent areas in Grasslands, property taxes in Butte Sink, water expense in Willow Creek and Colusa basin, etc. The owners did not consider water supply or water rights a problem. But the survey results indicated the greatest problems overall reported were the lack of ducks, and the expense of developing and maintaining habitat.

And yet, the survey indicated that the area of greatest agreement was that there is no problem getting persons to buy memberships or lease blinds. The club owners responding to the questionnaire also indicated that of the estimated 137,000 acres of natural vegetation flooded in 1975, 95 percent still remained in 1981. Based on the responses of 40 percent of these owners the 1981 estimated acreage of modified natural wetlands in private ownership was 137,150 acres.



Table 2

Results of Questionnaire on Problems Effecting  
Private Wetlands Owners 1981

<u>Area</u>	<u>Percent Returns</u>	<u>Major Problems</u>
Butte Basin	31%	Property taxes Trespass Habitat expense
Willow Creek	51%	Water expense Habitat expense Lack of ducks Property taxes
Colusa Basin	32%	Water expense Property taxes Trespass
Suisun Marsh	46%	Lack of ducks Poor water quality Habitat expense
West Grasslands	34%	Rafting Habitat expense Lack of ducks Property taxes
East Grasslands	18%	Water expense Lack of ducks
Yolo Basin	39%	Lack of ducks
Southern California	38%	Habitat expense Water expense Rafting

During the period of 1960 to present, there has been a continually accelerating, unquantified loss of waterfowl habitat on idle land when these lands are converted to more intensive agricultural, industrial and urban development. Excessive cost of development, lack of water, seepage, or isolation had prevented conversion until the post 1960 years when increased land values, flood protection, water delivery, new farm technology and markets or other conditions made development economically feasible and profitable. This type of wetland loss has greatly accelerated during the past two decades and has not been offset by private or state and federal government acquisition and/or development of wetlands.

A major habitat loss is the conversion of pasture and range lands to higher income producing crops that do not support periodic waterfowl use. This is best illustrated by the conversion of pasture lands to orchards, vineyards, and row crops on the west side of the San Joaquin Valley after the State Water Project brought a firm source of water to that area. Another example is in the grassland areas of Merced and Stanislaus counties with the change from range and pasture lands that supported waterfowl to vineyards, row crops, and commercial poultry raising facilities. These types of conversion have occurred statewide, and except for some isolated cases (Tulare Lake drainage ponds) have been detrimental to wetland habitats and the waterfowl resource.

The use of overhead sprinkler irrigation which replaced the less efficient flood irrigation on unlevelled meadows and other lowlands has extended alfalfa production out on to unlevelled, higher and steeper land and usurped water that created waterfowl habitat on these meadows and lowlands that benefited waterfowl.

Within the flood control channels, both existing and new, there has been an accelerated loss of wetland habitat, both permanent and seasonal, that had great value to the waterfowl resources of the State. Examples are the channelling of streambeds, resulting in the conversion of adjacent lands to agriculture, and harvest of riparian trees for pulpwood and the conversion of these wild lands to intensive agricultural use. The filling and leveling of land protected by flood control levees has become economically feasible because of increased land values, technical advances, and new agricultural markets.

In most instances, the changes are not reversible so the lands so affected will not be available for reconversion to waterfowl use. In other instances, the costs of the changes would be so great that the economics of reconverting to wetlands is not economically feasible. In the case of laser leveling of land, the flexibility provided for changing and expanding agricultural crop diversity will mean that cropping practices could change frequently and result in crops of little or no value to waterfowl. There is concern that this same rapid conversion and new found flexibility may mean a future reduction in "beneficial" crops such as rice.

The current situation is that California no longer provides the amount of "secure" habitat that is needed to adequately winter the number of waterfowl that it previously could accommodate and that should be available again. As breeding conditions in Canada and other northern production areas improve, then conditions in California must be improved also to provide assurance that the millions of migrating waterfowl will have the habitat needed for perpetuations of optimum numbers of waterfowl.

## B. THE HISTORY OF WATERFOWL RESOURCES AND EFFORTS TO MAINTAIN THEM

It is not possible to accurately assess, numerically, the waterfowl resources of California before settlement of the State began during the second half of the 19th century. Early accounts by explorers, settlers and market hunters referred to large concentrations of ducks and geese in many locations of the State; however, no accurate estimates of numbers are available.

Based on the journals of early explorers, settlers and market hunters, the literature on the historic occurrence of waterfowl in California indicates that waterfowl were extremely abundant, and that their distribution was widespread in the State (Willett 1912, Grinnell et al. 1918, Skinner 1962, USFWS 1979). Waterfowl together with many other species of wildlife that abounded in California were readily available to the early inhabitants. During the winter months when mining activities were for the most part halted in the Sierras, unemployed miners were drawn to this abundance of game to make a living (Unpublished Thesis Scott Stine 1980). In a short time market hunting provided a major food source for inhabitants with game markets established in Sacramento and San Francisco as early as 1849 (Ibid 1980). The reduction of waterfowl from excessive hunting began to be recognized in local areas of the State as early as the 1870's (Cooper 1880).

In 1913, the California Museum of Vertebrate Zoology sent letters of inquiry to responsible observers asking their assessment of the status of ducks, geese, and other game birds. The results, based on ten to sixty-one years of individual observations, estimated that ducks had averaged a fifty percent decrease in numbers, and in goose populations, a seventy-five percent reduction (Grinnell et al. 1918). Early authors investigating the depletion of birds attributed the reductions primarily to unregulated hunting (Dr. J. G. Cooper 1880, Joseph Grinnell 1918, and Harold C. Bryant 1915).

In response to the concern of many individuals, the California Legislature passed the Flint-Cary Law in 1913, which outlawed market hunting; however, in referendum, the voters overturned the Flint-Cary Law in 1914 by a small margin (DFG 1915). On the Federal level, the Weeks-McLean Law, designed to protect migratory birds and stop market hunting, became effective March 4, 1913. Because of the law's constitutional weakness, the backers supported a Congressional Resolution requesting that the President negotiate treaties with other North American countries rather than having the Weeks-McLean Law tested in court (Day 1949). The result of the Resolution was the ratification of a treaty with Great Britain on October 20, 1916 and the passage of the Migratory Bird Treaty Act. The Act, effective July 3, 1918, prohibited the sale of wild ducks and geese unless approved by the Secretary of Agriculture. The California Legislature followed in 1923, making it illegal to sell wild ducks and geese, the activity then considered to have the greatest impact on duck and goose populations at that time.

The positive results of the Federal and State protective legislation on waterfowl populations were severely masked by drought conditions which



occurred in the breeding grounds in North America beginning in the late 1920's and extending until the summer of 1935, and referred to as the "duck disaster" (Day 1949, Farrington 1945). The year 1935 was considered the all-time low in the continental supply of waterfowl.

During the drought the future of waterfowl was the subject of great concern in California and elsewhere in the United States and Canada. In addition to the drought both United States and Canadian conservation officials were concerned about the rapid encroachment of agriculture upon choice Canadian breeding grounds and warned that drainage and agriculture in southern parts of Alberta, Saskatchewan and elsewhere would prevent waterfowl populations from returning to historic levels (CFG 1931 and CFG 1932). A result of this concern was the formation of Ducks Unlimited in 1937, an organization through which sportsmen have spent large sums of money to improve breeding conditions for waterfowl in Canada. Most waterfowl experts consider Duck Unlimited's program an important and effective means of protecting waterfowl of the North American continent and just as important today as it was in the 1930's. Department representatives on inspection trips of California Duck Stamp Projects in Canada during the past ten years have reported observing extensive deterioration of the unprotected waterfowl breeding habitats and the value of duck stamp projects in reducing further losses.

Also of great concern during the late 1920's was the lack of refuge areas for wintering waterfowl in California. By 1926 the only wetland habitat remaining in the State was in duck clubs (30th Biennial Report of Fish and Game Commission 1926-28). There were few areas left where a duck could find sanctuary (35th Biennial Report of Fish and Game Commission 1936-38). As a result, the Governor appointed an Advisory Committee on Game Refuges which recommended establishment of a series of sanctuaries to give waterfowl some protection from hunting. The Legislature increased the hunting license fee in 1927 with one third of the hunting license fees to be used to acquire and develop refuges during a five-year-period. During this period four refuges were acquired and developed by the Division of Fish and Game, (Table 3).

Table 3

Establishment of Original Division of Fish  
and Game Waterfowl Refuges

<u>Year</u>	<u>Refuge</u>	<u>Acreage</u>
1929	Los Banos	3000
1931	Gray Lodge	2541
1931	Joice Island	1711
1931	Imperial	1100

Also as a result of the "duck disaster", Congress in response to public pressure, created the Migratory Bird Hunting Stamp Fund in 1934. Waterfowl hunters were required to purchase a Migratory Bird Hunting

Stamp (Duck Stamp) with the proceeds to be used to benefit waterfowl. Subsequent amendments have made this law the basis for the U.S. Fish and Wildlife Services wetland acquisition program. Much of the wetland habitat that exists today has been recreated by state, federal and private waterfowl interests (Miller 1962).

The 10,776 acre Sacramento National Wildlife Refuge was established in 1937 with funds from the Emergency Conservation Fund Act of 1933 providing food and resting areas for wintering ducks and geese.

California began to experience some serious crop depredation problems in the late thirties and early forties as the waterfowl population increased. That increase was due to better breeding conditions resulting from wetter weather, the combined efforts of Duck Unlimited and the U.S. Fish and Wildlife Service in improving breeding areas, from the protection afforded on the breeding and wintering grounds by State and Federal refuges, and the outlawing of market hunting (Table 4).

Table 4

Duck Population in Provinces of Manitoba, Saskatchewan, and Alberta and the Northwest Territories, Estimated from Ground and Aerial Surveys Conducted in July and August Each Year by Ducks Unlimited (Canada)\*

<u>Year</u>	<u>Estimated Population</u>	<u>Increase Over Previous Year</u>	<u>Percent Increase</u>
1938	49,180,000		
1939	59,682,000	10,502,000	21.3
1940	70,859,000	11,177,000	18.7
1941	75,238,000	4,379,000	6.17
1942	96,848,000	21,610,000	28.7
1943	125,000,000	28,152,000	29.0
1944	140,000,000	15,000,000	12.0

(From Farrington 1945)

The development of agriculture in California had, and continues to have, a major impact on the species, distribution and numbers of waterfowl in the State. The reclamation of the natural wetlands, i.e., tule marshes, overflow lands, salt and brackish marshes and tide flats, resulted in some species of waterfowl being forced to use agricultural lands. Rice is most closely associated with waterfowl in California; however, other grains also have an influence. For example, the current practice of flooding corn stubble in the Sacramento-San Joaquin Delta for hunting and/or leaching or weed control, has resulted in many ducks leaving the Suisun Marsh for the Delta (Michny 1979). The construction of irrigation

canals and flood irrigation of large tracts of land in Merced County to produce livestock pasture in the late 1800's resulted in that area quickly becoming a "Mecca" for waterfowl (Exley 1931, Bryant 1915). A January 4, 1903 article in the San Francisco Chronicle on waterfowl hunting reported of lands in the Los Banos area, "if as free from irrigation now as 20 years ago, wild ducks would be as numerous on Alameda, Sonoma, and San Bruno marshes today..."

Rice production in California grew from 1400 acres in 1912 to 162,000 acres in 1920, and 240,000 acres in 1945. Until lifted in 1973 federal allotments held the annual rice acreage to under 340,000 acres. Since 1973 there has been an upward trend in rice planting in California. An estimated 550,000 acres were in production in 1980. Some major species of waterfowl displaced from their natural habitat found the rice acreage an ideal substitute, even better in some respects than the natural wetlands (Biehn 1951, DFG 1955). As a result conflicts between rice grower and waterfowl developed rapidly. The 1918-1920 Biennial Report of the Fish and Game Commission stated that ducks depredating rice was the Commission's biggest problem. Following the great decline of waterfowl during the 1920's and early 1930's, depredation problems were at a minimum if not nonexistent until the early 1940's (Horn 1953). The increasing waterfowl populations following the end of the drought reached a level that by 1939 again caused crop loss problems. In 1941 the California Farm Bureau estimated \$600,000 damage to rice crops by waterfowl. Irrigated pastures and lettuce in Imperial Valley were also damaged by increasing waterfowl populations. Crop losses to waterfowl reached \$1.75 million during 1943 (Horn 1953).

Crop damages increased because (1) waterfowl populations were increasing very rapidly at this time; (2) during World War II, there was a shortage of ammunition both for herding the birds and for sportsmen's use and a sharp decrease in the numbers of hunters; (3) wet weather and labor shortages increased the time of harvesting and enabled the birds to damage more rice; (4) improperly prepared rice fields, more numerous during the war years, resulted in small open ponds in the fields which were a starting point for ducks to light and start feeding (Biehn 1951).

In June 1943 a Joint Wildlife Management Committee was formed as a committee of the State Chamber of Commerce at the insistence of the California rice industry and the California Farm Bureau. The committee was composed of growers, sportsmen, legislators and representatives from State and Federal agricultural and game agencies (Outdoor California 1955). The committee was to design a solution to the waterfowl crop depredation problem. After numerous meetings a program was developed and put into practice on an experimental basis. The committee recommended establishment of waterfowl food raising areas near sites where crop damage was severe. These feeding areas would provide habitat for waterfowl during the period between their arrival from the breeding grounds until the rice was harvested. After the harvest the birds could range out onto the rice growing areas to feed on waste grain and not be unwelcome.

Recommendations for increased farming on federal refuges, leasing and farming of the present Colusa and Sutter refuges and the feeding of dry grains on flooded areas in the Imperial and San Joaquin Valleys were undertaken in 1944 and crop losses that year dropped remarkably (Horn 1953). The result was that both the California and National Farm Bureau federations supported the Lea Act, Public Law 534 (passed in May 1948), which provided for the acquisition and development of waterfowl management lands by the U.S. Fish and Wildlife Service. The Act required the State to fund the acquisition of equivalent acreages of waterfowl habitat. In 1949 the Wildlife Conservation Board (WCB) made acquisition of waterfowl management areas its number one priority and allocated four million dollars for acquisition and development of waterfowl habitat.

An intensive study was conducted by representatives of the U.S. Fish and Wildlife Service, WCB and the Division of Fish and Game to develop a management plan to protect waterfowl and agriculture, (Gordon 1950). The Waterfowl Management Plan identified and recommended State acquisition of seven primary waterfowl management areas. The Plan also recommended that the U.S. Fish and Wildlife Service (1) enlarge Colusa and Sutter NWRs, (2) acquire an area in the San Joaquin Valley, and (3) develop land leased from the Imperial Irrigation District in the Imperial Valley (Gordon Ibid). The plan also resulted in a Joint Statement of Policy: U.S. Fish and Wildlife Service and Fish and Game Commission, re Management of Waterfowl Areas signed April 7, 1952. The purpose of the Joint Statement was (a) to provide more adequate habitat for waterfowl, (b) to give protection to agricultural crops against depredations, and (c) improve conditions for the hunters. In accordance with the plan, WCB acquired an additional 4047 acres at Gray Lodge in 1952 through 1955. Grizzly Island Waterfowl Area consisting of 8223 acres was acquired in 1950. Mendota Waterfowl Area was purchased in 1954 and 1955. Acquisition of the Wister Unit of Imperial Waterfowl Area was made in 1954 through 1956. On March 4, 1954, the Department of Fish and Game advised the Wildlife Conservation Board that funds were not available to operate more than the four areas already acquired and the remaining acquisition funds should be transferred to other projects (Minutes of 3/24/54 WCB Meeting). Areas dropped were Butte Sink, Tupman and enlargement of Los Banos Waterfowl Area.

The U.S. Fish and Wildlife Service under the Lea Act authority and funding enlarged Colusa NWR in 1949 and 1952, Sutter NWR in 1953 and 1956, purchased Merced NWR in 1951 and enlarged Salton Sea NWR in June 1948.

Since the wetland habitat acquisitions and developments made under the Joint Statement of Policy, both the Department of Fish and Game, through the Wildlife Conservation Board, and the U.S. Fish and Wildlife Service have continued to acquire and develop wetlands, (Table 5).

Concern for the need to increase the value of the remaining wetlands in the State for wintering waterfowl led to the establishment of a Marsh Management Project by the Department of Fish and Game in 1956. The object of the marsh study was to develop the most efficient and

TABLE 5  
CHRONOLOGY OF DEPARTMENT OF FISH AND GAME AND UNITED STATES FISH AND WILDLIFE  
SERVICE WATERFOWL HABITAT ACQUISITION IN CALIFORNIA\*

Year Established	Name of Area	County	Addition	Total Acreage Jan. 1982	Wetland Acreage
1908	Lower Klamath NWR <sup>1</sup>	Siskiyou		20,122	9,345
1911	Clear Lake NWR <sup>1</sup>	Modoc		33,439	1,890
1928	Tule Lake NWR <sup>1</sup>	Siskiyou		37,336	3,825
1929	Los Banos WA	Merced	1965	3,207	2,400
1930	Salton Sea NWR	Imperial	1948	37,218	285
1931	Gray Lodge WA	Butte	1952-71	8,600	4,500
1931	Joice Island WA	Solano		1,887	1,793
1931	Imperial WA	Imperial	1954	7,825	3,800
1937	Sacramento NWR	Glenn & Colusa	1971	10,793	6,150
1941	Havasu NWR	San Bernardino		5,871	520
1941	Imperial NWR	Imperial		7,958	3,640
1942	Honey Lake WA	Lassen	1970	4,980	2,700
1942	Madeline WA	Lassen		-SOLD-	
1944	Sutter NWR	Sutter	1953-56	2,591	2,497
1945	Colusa NWR	Colusa	1949-52	4,040	2,569
1950	Grizzly Island WA	Solano		8,781	6,125
1951	Merced NWR	Merced		2,562	1,532
1954	Mendota WA	Fresno	1955-65	9,444	6,500
1960	Kern NWR	Kern		10,618	3,200
1960	Modoc NWR	Modoc		6,202	345
1962	Delevan NWR	Colusa	1963	5,633	3,106
1964	Cibola NWR	Imperial		1,255	280
1965	Lower Sherman Island	Sacramento		3,100	1,700
1965	Volta WA <sup>2</sup>	Merced		2,700	2,600
1965	Navarro River Public Access	Mendocino	1980	57	20
1967	San Luis NWR	Merced	1970	7,340	2,666
1969	Buena Vista Lagoon ER	San Diego	1972-73-74 et al.	204	40
1970	Kesterson NWR	Merced		5,900	2,615
1973	Tomales Bay ER	Marin	1974-75	517	350
1973	Point Edith	Contra Costa		380	380
1973	Bolsa Chica ER	Orange		530	294
1974	San Pablo Bay NWR <sup>3</sup>	Marin-Sonoma		11,822	135
1974	Navarro ER	Mendocino		57	20
1974	Humboldt Bay NWR <sup>3</sup>	Humboldt	1981	559	115
1974	Seal Beach NWR	Orange		911	640
1974	Culinan Ranch	Solano		20	20
1974	San Francisco Bay NWR <sup>3</sup>	San Mateo-Alameda Santa Clara		16,684	366
1974	Salinas River NWR <sup>4</sup>	Monterey		518	194
1974	Redwood Shores ER	San Mateo		132	100
1974	Bair Island <sup>5</sup>	San Mateo		988	960
1975	Big Lagoon WA <sup>6</sup>	Humboldt		1,682	595
1975	Upper Newport Bay ER	Orange		741	346
1976	San Pablo Bay WA <sup>5</sup>	Marin-Sonoma		12,320	4,320
1976	Napa Marsh-Coon Island ER <sup>6</sup>	Napa		250	250
1976	Corte Madera ER	Marin		95	85
1976	Peytonia Slough ER <sup>8</sup>	Solano		595	100
1976	Eureka Slough WA	Humboldt		3.5	3.5
1977	Cinder Flats	Shasta	1979	720	100
1977	Hill Slough WA	Solano		1,123	200
1977	Pismo Lake ER	San Luis Obispo	1978-81	69	30
1977	San Elijo Lagoon	San Diego		268	200
1978	Petaluma Marsh WA	Sonoma-Marin	1979	2,006	1,700
1978	Batiquitos Lagoon ER	San Diego		135	55
1979	Napa Marsh-White Slough	Napa		40	40
	Fagen Slough	Napa		340	330
1979	Lake Earl/Talawa WA <sup>3</sup>	Del Norte	1981	4,730	2,311
1979	Crescent City Marsh WA	Del Norte		334	100
1979	San Dieguito Lagoon	San Diego	1981	99	50
1979	Channel Drive (Petaluma Marsh)	Marin	1981	53	53
1979	Grasslands, FWMA <sup>9</sup>	Merced	1981	9,386	8,224
1979	Day Island	Marin		127	75
1979	Shellmaker	Sonoma		3	2
1979	Walker Creek Marsh	Marin		16	15
1980	Elkhorn Slough ER	Monterey	1981	1,006	575
1980	Tijuana Slough NWR <sup>9</sup>	San Diego		510	475
1980	Napa Marsh-Sandpiper	Napa		13	13
1980	Butte Sink FWMA <sup>10</sup>	Colusa		1,154	435
1980	San Jacinto WA	Riverside	1981	2,680	0
1981	Goleta Slough	Santa Barbara		34	25
1981	Butte Valley WA	Siskiyou		13,200	3,000
				335,450.5	103,902.5

\*National Wildlife Refuge System Land Use Inventory Reports FY 79-80&81  
and Department of Fish and Game Unpublished.

<sup>1</sup> By Presidential Proclamation

<sup>2</sup> Leased from Bureau of Reclamation

<sup>3</sup> Portion 66 year lease State Lands Commission

<sup>4</sup> Operated by DFG as a WA

<sup>5</sup> 66 year lease State Lands Commission

<sup>6</sup> 10 year lease State Lands Commission, expires 1985

<sup>7</sup> Includes 388 acres conservation easement

<sup>8</sup> All easements on private wetlands

<sup>9</sup> Includes parcels under 66 year lease State Lands Commission and U.S. Navy agreement

<sup>10</sup> Includes 714 acres under easement

economical methods to improve waterfowl habitats through the use of native and exotic marsh plants. By 1979 when budget cuts necessitated terminating this project, many important findings had been made which allowed public and private marsh managers to improve the value of their wetlands for wintering waterfowl.

Continuing concern for the need to preserve wetlands prompted the Administrator of the Resources Agency to appoint a Wetlands Task Force in December 1964. Members of the task force represented Departments of Fish and Game, Water Resources, Parks and Recreation, and Conservation. Their recommendations were contained in a Report to the Resources Administrator on Wetland Preservation Prepared by the Wetlands Task Force, May 1965. Few of the recommendations were implemented due to the costs involved, except that the U.S. Fish and Wildlife Service acquired San Luis Island NWR and has acquired 17,500 acres in wetlands conservation easements in California.

The California Fish and Wildlife Plan of 1966 was prepared for the Resources Agency as a contribution to the State Development Plan, assembled by the State Office of Planning. The section of this plan on waterfowl addressed the problems of dwindling wetland habitat, the importance of seasonally flooded agricultural lands and the importance of habitat provided by private duck clubs. The plan also recommended actions to protect private wetlands which included conservation easement with the option of the State providing water in lieu of cash, real estate tax reduction and State zoning. The 1966 plan suggested State acquisition of wetlands; it also recognized the necessity of securing additional funding to develop and maintain any new waterfowl habitat, citing budgetary problems of the Department in managing the wetlands it now owns. Adequate funding for these recommendations to protect wetlands for waterfowl also did not materialize.

Part of the funding problem was addressed when, in 1971, California became the first state in the nation to have a duck stamp. Until 1977 when the law was amended, 80 percent of the money received from the sale of duck stamps went to projects for Canadian breeding habitat, 15 percent was used for administration and 5 percent could be used for California projects. Since 1977 the revenues for developing waterfowl breeding habitat have been split evenly between Canada and California projects.

Another action by the federal government to preserve private and public wetlands in California was the Grassland Water Bill (PL 674, 68 Stat. 879 of 1954). That act provided water for waterfowl management and authorized construction of facilities for its distribution in the Grasslands Water District of the San Joaquin Valley. The Grasslands area is one of the most important waterfowl wintering areas in California and was to be without a source of water after 1953. The Grasslands Water Bill authorized the Secretary of Interior to deliver Central Valley Project surplus water to the Grasslands. However, there is a need to provide this water on a top priority basis as a project purpose.

There have been other actions by the federal government to protect wetlands in California. The United States Department of Agriculture,

Soil Conservation Service, administers the Water Bank Program authorized in the Water Bank Act, Public Law 91-559, approved December 19, 1970.

Under the Water Bank Program, the Secretary of Agriculture is authorized to enter into ten-year agreements with landowners and operators in important migratory waterfowl nesting and breeding areas to preserve, restore and improve the nation's wetlands. In California, as of July 1980, 29,363 acres were under such agreements in eight counties.\*

In a nationwide priority list developed by the U.S. Fish and Wildlife Service to guide federal wetland preservation efforts, California Central Valley ranked fourth and the California Coast was sixth overall. The Central Valley wetlands received the highest priority in the nation for preservation and development of wintering waterfowl habitat. Concept Plans were prepared by the U.S. Fish and Wildlife Service with assistance from the Department of Fish and Game for both areas as required by the Migratory Bird Land Acquisition Program for use of funds from the sale of Federal Migratory Bird Stamps. The plans contain a detailed description of habitats including a priority listing based on biological value weighted by the threat of loss from conversion to other use, and estimated cost of implementation.

The U.S. Fish and Wildlife Service began to implement its conservation easement program in 1978, under the authority of the Migratory Bird Conservation Act. The easement program was designed to assure that existing, privately owned wetlands would continue to be managed in perpetuity for waterfowl. The U.S. Fish and Wildlife Service received the approval of the Migratory Bird Commission for the purchase of easement areas after approval by the appropriate county boards of supervisors and the California Fish and Game Commission. The goals for acquiring perpetual easements from willing sellers in these areas, were 48,000 acres in the West Grasslands, 10,900 acres in the Butte Sink and 7,900 acres in the Colusa Basin. Easements are purchased with funds authorized annually and must compete with the acquisition of National Wildlife Refuges which are also funded from the sale of Migratory Bird Hunting and Conservation stamps. As of September 1982, 17,500 acres of easements in the West Grasslands and 715 acres in Butte Sink had been acquired. It is not known what the future of this program will be because of the funds advanced to the duck stamp fund will have to be paid back from the receipt of duck stamp sales, beginning in 1983.

In 1979 the U.S. Bureau of Reclamation began the Central Valley Fish and Wildlife Management Study, which will identify present and future fish and wildlife problems and opportunities associated with federal water development, distribution and utilization within the Central Valley. The waterfowl portions of this study are scheduled for completion in fiscal year 1986. The study results will serve as the basis for proposing how the problems can be resolved and the opportunities realized. Recognizing the impact of water development on waterfowl and wetland habitat in the Central Valley, the study will address the following:

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\*Butte, Colusa, Lassen, Merced, Modoc, Siskiyou, Sutter and Yolo

- 1) Investigate and identify sources of firm water supply for refuges and wildlife management areas.
- 2) Appraise the means to improve wildlife habitat on federal, state and local water project lands.
- 3) Appraise the need for new waterfowl habitat and alternative measures that could be taken to provide it.

Collectively the actions taken by the state and federal governments and the private duck club owners to develop and maintain waterfowl habitat, together with the large contribution to waterfowl that existing agricultural crop residues furnish, has allowed the waterfowl population of the Pacific Flyway to increase since 1935, to 8-10 million birds. Long-term population trends for most species appear stable or slightly increasing. The population wintering in California has shown an increase except for drought years (Table 6). Crop depredation by waterfowl has virtually been eliminated primarily through the relief afforded by state and federal areas. On state and federal areas where records are kept, between 104,000 and 163,000 annual hunting days, have been provided since the mid 1960's, with a consistent annual average bag per hunter of between 1.6 and 2.6 birds.

However, the future of this relationship of wetland habitats (i.e. Federal, State and private modified natural wetlands) to agricultural feeding areas is not secure in California. The continued loss of private wetlands or changes in crops or cultural methods will result in reductions in the ability of California to support wintering waterfowl. Therefore, in addition to protecting, enhancing and increasing the wetlands, measures are needed to protect the availability of agricultural crop residue feeding areas.





Table 6  
Midwinter Waterfowl Inventory  
California

<u>Year (Jan)</u>	<u>Number Birds Counted*</u>	<u>Year (Jan)</u>	<u>Number Birds Counted*</u>
1936	1,554,379	1959	6,326,609
1937	1,731,592	1960	5,072,667
1938	1,692,146	1961	5,391,661
1939	2,670,020	1962	4,814,599
1940	1,573,571	1963	5,044,022
1941	1,991,911	1964	4,808,441
1942	2,148,492	1965	5,835,434
1943	2,157,348	1966	3,972,334
1944	3,653,281	1967	5,334,025
1945	6,088,063	1968	4,325,836
1946	2,642,126	1969	4,229,321
1947	2,250,089	1970	6,015,367
1948	4,408,302	1971	7,606,740
1949	5,366,945	1972	5,954,042
1950	4,393,303	1973	5,741,891
<hr/>		1974	6,742,315
Began the use of airplanes		1975	6,225,493
<hr/>		1976	5,912,855
1951	4,972,811	1977	6,682,200
1952	3,764,108	1978	6,722,850
<hr/>		1979	5,896,390
Standardized survey methods		1980	7,102,715
<hr/>		1981	5,192,160
1953	5,687,151	1982	4,802,255
1954	5,853,635		
1955	5,372,429		
1956	6,574,146		
1957	5,177,984		
1958	6,681,382		

\* Grand total, ducks, geese, swans and coots, surviving the hunting season and represents the population which returns to the northern breeding grounds.

## V. PRESENT STATUS OF SIGNIFICANT WATERFOWL WINTERING AREAS

Many of the wetlands of significant importance to waterfowl in California are described in the U.S. Fish and Wildlife Service's Concept Plan For Waterfowl Wintering Habitat Preservation, Central Valley California and California Coast. Since these publications contain excellent detailed descriptions of locations, acreages, threats and biological values of individual wetland areas for wintering waterfowl of the Pacific Flyway and priorities for protection in these areas the reader is referred to these publications for greater detail. However, the wetlands of the Great Basin and the Salton Sea areas are not addressed by the federal publications. The Great Basin area is an important migration and breeding area, and in warmer winters it provides wintering habitat for up to 500,000 (1980) total waterfowl. The Salton Sea area has averaged 93,742 total waterfowl during the last ten years (Winter Inventories 1973-82). These areas are important even though they do not winter as many birds as does the Central Valley.

### A. Coastal Area

Coastal wetlands are utilized by less than five percent of the waterfowl of the Pacific Flyway. However, certain species, such as black brant, scaup, scoters, canvasback and bufflehead, utilize coastal wetlands to a major extent. The entire population of endangered Aleutian goose utilizes coastal wetlands during fall and spring migrations.

In addition, the seasonal marsh areas around Humboldt and San Francisco Bays continue to provide significant habitat for all species of ducks found in California. The coastal wetlands also provide essential habitat for a variety of listed rare or endangered species such as the least tern, clapper rail, and the brown pelican.

The Department of Fish and Game supports the recommendations of the United States Fish and Wildlife Service's Concept Plan for Waterfowl Wintering Habitat Preservation, California Coast, including the importance of the various coastal wetlands to waterfowl, threats, preservation efforts and preservation priorities. With proper management coastal wetlands can once again provide some significant habitat for migratory waterfowl.

Major differences exist between wetlands of importance to waterfowl in coastal areas and the interior portions of California which make direct comparisons difficult. Except for a few duck clubs where habitat is managed, coastal waterfowl habitat consists of natural wetlands, such as bays, lagoons, sloughs and tidal and seasonal marshes; interior waterfowl habitat consists almost entirely of artificially managed habitats. While the remaining coastal wetlands are reasonably well protected under the "Public Trust," the Coastal Act of 1976 and the San Francisco Bay Plan adopted by the Legislature in 1969, the pressure to develop the remaining coastal wetlands continues unabated especially in urban areas around San Francisco Bay and southern California.

There is only minimal protection for the privately owned, modified natural wetlands of the interior portions of the State. The conversion

of coastal wetlands has slowed considerably compared to continuing conversion of interior wetlands to other land uses, primarily agriculture.

The California Coastal Commission and San Francisco Bay Conservation and Development Commission (BCDC) have done an exemplary job of protecting wetland resources within their areas of responsibility. Enactment and implementation of State laws such as the Coastal Act and McAtteer-Petris Act are absolutely essential tools for the successful maintenance and restoration of coastal wetlands. Tools such as these are highly desirable adjuncts to the Department's efforts to protect and improve wetlands throughout the state. Because the California Coastal Commission and BCDC have been instrumental in protecting coastal wetland resources, these programs should continue and be strengthened as the main state effort to carry out the goals of SCR 28 in the coastal zone.

There is, however, a serious flaw in existing state law for protecting wetlands in the San Francisco Bay Area. In the Bay Area, state BCDC jurisdiction under the McAtteer-Petris Act extends only to existing tidal waters. The State Coastal Act on the other hand protects all wetlands in the coastal zone including freshwater and seasonal wetlands. The Bay Area has over 92,000 acres of diked, unfilled former tidelands, most of which function as essential seasonal wetlands for migratory birds and resident wildlife. At present, the only regulatory program for protecting these diked baylands from being filled is administered by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. The Corps regulations are currently being weakened to the point where they may no longer assure protection of this important habitat resource. As indicated by the BCDC in 1982, there is a need to protect important state resources including wetland-dependent wildlife in the diked bayland areas. The Department concurs with this view.

Reports of historic waterfowl use of coastal wetlands indicate a more extensive use than occurs today (Willet 1912, Menzie 1924, Welch 1931). Upstream diversions, dikes for salt production and land fills have reduced the amount of fresh and brackish water marshes to a small remnant of historical wetland areas. Along the coast the urban and industrial development of the upland areas (native grasslands and historic grain fields) has eliminated important feeding areas historically used by waterfowl (Willet 1912, Welch 1931). Fresh and brackish water marshes are more attractive than marine environments to most of the dabbling ducks. Originally gun clubs in the Los Angeles area, San Francisco Bay and Elkhorn Slough used this preference for fresh water to manage their clubs to attract waterfowl (Grinnell 1918, DeWitt 1910, Payne 1908).

There is potential for substantial increases of fresh and brackish water wetlands in the coastal areas by utilizing municipal wastewater, particularly in the San Francisco Bay Area. During the past decade the public has become increasingly aware of the socio-economic value of the State's rivers, lakes and bays. As a result, regulatory agencies have placed stringent water quality standards on effluent entering public

waters. Concurrent with the increase in public concern has been the escalating costs of sewage treatment. Research conducted in this county and abroad has, in most cases, demonstrated that marsh vegetation responds quite satisfactorily to the discharge of adequately treated wastewater to wetlands. The discharge from municipal waste treatment facilities to nearby wetlands rather than to distant deep offshore water, could result in significant savings in construction costs and benefits to degraded wetland areas.

California has been a leader in using clean wastewater to improve wetlands. The following pilot programs are either in operation or planned for the near future: Arcata, 5 to 10 acres (100 planned); Eureka, about 100 acres (under construction); Mountain View, 20 to 25 acres; Fairfield, 250 acres (in progress); Upper Newport Bay, 50 acres (100 acres planned); Hayward, 120 acres planned; Coyote Hills, 20 acres; Lodi, 20 acres; Santa Rosa, 100 acres planned; Hemet, several hundred acres planned on the San Jacinto Wildlife Area following the construction of a reservoir and pipeline delivery system.

To date no adverse impacts have occurred on well managed wastewater marshes. The benefits to marsh associated wildlife have been clearly demonstrated, provided that detailed and site-specific marsh management plans are utilized for each new marsh and the wastewater is adequately and reliably treated prior to discharge into the marsh. The need for wastewater marshes is expected to grow in direct proportion to the growth of metropolitan areas. One concern encountered is related to protection of public health. Public health officials have been reluctant to approve recreational activities in these marshes which require body contact with the wastewater.

#### B. Great Basin

The Great Basin contains the three most important waterfowl production counties in California. Siskiyou County is ranked number one in the State with most of its production on the Tululake-Klamath Basin NWRs, Meiss Lake and White Horse Flat Reservoir. Klamath Basin National Wildlife Refuges are among the best waterfowl producing areas in the nation with production averaging over 50,000 ducks and geese a year and up to 70,000 birds under ideal conditions. The Klamath Basin is located at the junction of two major migration routes in the Pacific Flyway where the Pacific Coast route turns inland and birds from the eastern route turn west. From three to seven million ducks and geese annually stop in the Klamath Basin to feed and rest before continuing their southern migration. Waterfowl also use the refuges in the spring when returning to their breeding areas in the northern states, Canada and Alaska. The use of the Klamath Basin by wintering waterfowl varies with the severity of weather. During warmer winters substantial numbers of waterfowl spend the winter in the Klamath Basin. Water for the Basin's refuges is provided by the runoff from surrounding irrigated agricultural lands.

Meiss Lake (Butte Valley Wildlife Area) acquired by the Department of Fish and Game through the Wildlife Conservation Board in 1981 will augment the high quality habitat of the Klamath Basin refuges when fully developed for waterfowl.

Modoc County is the second most important county for waterfowl production. The three alkali lakes in Surprise Valley, Goose Lake, the Pit River Valley and Modoc NWR are the major waterfowl production areas.

Lassen County is the third most important waterfowl production county. Honey Lake Valley, Big Valley and Mountain Meadows Reservoir are the major production areas. The increasing use of sprinkler irrigation on private lands throughout the Great Basin has accelerated in recent years and has reduced the amount and value of wetlands for waterfowl. Therefore, there is a growing need for the state and federal governments to acquire and develop new wetlands in this area, to replace the loss of habitat for breeding waterfowl populations, primarily Canada geese and mallards.

### C. Central Valley

The importance of California's Central Valley cannot be over emphasized. This area supports 60 percent of the Pacific Flyway wintering waterfowl population. It is reported to be the highest waterfowl use area on the North American continent, utilized by 8-10 million wintering birds, or about 18 percent of the continental wintering waterfowl population. The area is ranked fourth overall in the nation out of 33 other areas on the national priority scale of the U.S. Fish and Wildlife Service's Migratory Bird Land Acquisition Program. The Central Valley has the highest priority for preservation of wintering areas for waterfowl in the nation.

The major effort to preserve, improve and increase wetlands for wintering waterfowl should be made in the Central Valley. The highest priority is securing adequate water supplies for existing public and private wetlands.

#### 1. Butte Basin

The Butte Basin has the greatest concentration of waterfowl of any area in California during the winter months (Arend 1967). With the assistance of the Department of Fish and Game, the U.S. Fish and Wildlife Service ranked the Butte Basin first priority for wetland preservation in California based on the value to waterfowl and the threat of loss to other land uses (USFWS 1979).

Water for the Butte Basin currently comes from developed irrigation water from Butte Creek, agricultural drainage from the Cherokee Drain Canal, and Reclamation District 833 Drain Canal. Other water sources are flood overflows of the Sacramento River and Butte Creek. On the Gray Lodge Wildlife Area ground water is pumped. The water needs of the lower Butte Basin duck clubs are currently being met by agreements with the Western Canal Company and Reclamation District No. 833 (Leach and Van Woert 1968). Ample ground water exists under the basin and is not used for wetlands except by the Gray Lodge Wildlife Area. The current average price to pump ground water is about twelve dollars per acre foot in the northern Sacramento Valley (1982 DWR unpublished report). However, the Department of Water

Resources does not expect for agricultural return flows to the Butte Basin to lessen dramatically, particularly from any upstream water conservation activity. This means that in the near future it will not be necessary to pump ground water or seek other water supplies for private clubs in this area.

The Fish and Wildlife Service has acquired 440 acres in fee as sanctuary and 714 acres of perpetual wetland easements in the Butte Basin as of January 1982. The Service's goal is to acquire 10,900 acres of easements in the Butte Basin.

Information obtained from "1981 Survey of Owners of Private Wetlands" indicates there are approximately 10,137 acres of modified natural wetlands on clubs in the Butte Basin. Seven thousand of the seventeen thousand acres in the Butte Sink have been converted from managed wetlands to rice in the last ten years.

The survey also indicated that high property taxes pose major problems to wetland owners.

## 2. Colusa Basin

Three National Wildlife Refuges in the Colusa Basin make the basin the third most important wetland area in terms of number of birds counted in the mid-winter inventories. The once extensive wetland habitat in the basin is now restricted to the NWRs and two small isolated units of private marsh -- the Willow Creek area adjacent to Sacramento NWR and the Lurline Creek area just south of Delevan NWR. The private wetlands in the basin are steadily being converted to rice even though all the lands in the Willow Creek area contain a deed restriction that they are to be maintained in a state of nature as a private gun club.

The Willow Creek area obtains its fall flooding water primarily from the Willow Creek Mutual Water Company which purchases rice drain water from the Provident Irrigation District (PID). The PID also sells excess water to the Willow Creek Water District when available. Ten deep wells provide the additional water required to complete flooding of the private duck clubs. Clubs in the Willow Creek area not served by the water company obtain their water from the Glenn Colusa Irrigation District (GCID). DWR believes that future water supplies for this area are dependable. In the Willow Creek area six thousand acres out of thirteen thousand have been converted to rice in the past fifteen years.

Most private wetlands in the Lurline Creek area purchase rice drainage water for fall flooding from the Maxwell Irrigation District (MID). Some duck clubs pump water from Lurline Creek or the Colusa Trough (2047 canal) on appropriative water rights. There are no wells in the Lurline Creek area.

Information obtained from 1981 survey indicates 2174 acres of modified natural wetlands occur on private duck clubs in the Colusa Basin. Water supplies are believed dependable for this area by the DWR. Local users, however, indicate there have been problems in timing of water delivery.

### 3. Suisun Marsh

The Suisun Marsh is the remaining significant remnant of the vast wetlands that formed the Sacramento-San Joaquin Delta. Most of the Marsh is no longer a natural wetland. It is now protected from tidal action with levees; water levels are controlled with tidegates and a system of ditches. The area is managed primarily for wintering waterfowl, primarily ducks. The fact that 53,620 acres of public and private wetlands remain is due largely to the salinity of the surrounding water which precludes agriculture, and the desire of hunters to have a place to hunt ducks. In 1977 the State Legislature enacted the Suisun Marsh Preservation Act which protects the Marsh from conversion to other land uses and includes an upland buffer zone. Water quality, not availability or cost, is the major water related problem for this area.

Tide gates are used by the State and private duck clubs to flood, circulate and drain water which is obtained from an extensive network of tidal sloughs and channels throughout the Marsh. The duration of salinity intrusion into the Marsh from the San Pablo Bay has increased during periods of low outflow in recent years; this is a result of upstream diversions including the Central Valley Project (CVP), the State Water Project (SWP), municipalities and agriculture.

In 1980 the State Water Resources Control Board issued Water Right Decision 1485 which included provisions for protection of the Suisun Marsh and required development of a plan to insure that water quality standards adopted by the Board are met. In September 1980 the Department of Water Resources published the Plan of Protection for the Marsh including a Draft Environmental Impact Report. If implemented the plan will assure water of a quality adequate to maintain high quality habitat for waterfowl and other brackish water marsh-related wildlife.

Duck club owners responding to the 1981 survey questionnaire indicated that reduction of duck numbers in recent years, poor water quality and expense of maintaining habitat were their major problems.

### 4. San Joaquin Basin

The Grasslands of western Merced County comprise the largest remaining area of wetland habitat in the San Joaquin Valley. In 1973 Merced County contained 60,266 acres or 90 percent of all the

wetlands on private ducks clubs located in the San Joaquin Valley (Rempel 1974). The number of waterfowl counted in the Grasslands during mid-winter inventories is exceeded only by the Butte Basin. The San Joaquin basin contains three national wildlife refuges and two state wildlife areas. Merced County claims to have the highest duck harvest of any county in the nation.

Agricultural drain water is the primary source of water used in the summer for waterfowl food production on private wetlands. The Grasslands Water District also has a 50,000 acre-foot per year contract for CVP water delivery between September 15 and November 30 and a right for 15 cfs, up to 2400 acre-feet per year, on Garzas or Los Banos Creek from June 1 - December 31. Good quality ground water is available in western Merced County. DWR indicates adequate surface water supplies will continue to be available in the future.

#### 5. Tulare Basin

The wetlands in the Tulare Basin ranked the highest in the State in terms of threat of loss to other land uses when rated by the Fish and Wildlife Service in 1978. The Department's 1975 Duck Club Survey listed 5,713 acres of private wetlands which is a 41% reduction since 1960. It is not known to what extent the private wetlands in the Tulare Basin have decreased since 1975. There are two public wetlands areas in the basin--Kern NWR and Mendota WA.

The water source for the wetlands in the southern portion of the basin including the Kern NWR is primarily ground water. The escalating cost of pumping water and overdraft are the major threats to the perpetuation of wetlands in the basin. In the northern part of the basin Mendota WA and the private wetlands in its vicinity primarily use surface water from the Mendota Pool. Only a quarter of the Mendota WA water supply is under firm contract with the U.S. Bureau of Reclamation; the remainder is on an if-and-when available basis.

#### D. Salton Sea

Many thousands of wintering waterfowl once used the delta wetlands of the Colorado River in Mexico. Most of the birds from this area moved into the Salton Sea area following the 1901 diversion of Colorado River water into this desert environment. The uncontrolled flooding of the Sea during 1905 to 1907 provided additional habitat. As agriculture developed with the importation of water, so did crop depredation by waterfowl in the Imperial Valley at the southern end of the Salton Sea.

Crop depredation problems at the north end of the Sea (Coachella Valley) have been minor.

Banding studies suggest that the Salton Sea area wetlands provide key wintering habitat for waterfowl that breed in Montana, Idaho and northern Utah and migrate down the east side of the Sierras. The first waterfowl



inventories were conducted in 1947 on the Salton Sea NWR. The entire area has since been included in the Mid-winter Waterfowl Inventory. The highest number of waterfowl counted was 193,020 in 1970. The lowest number was 53,470 in 1981. The average for the period 1961-70 was 152,350 birds and for 1971-80, 100,886. Wigeons, the major direct cause of damage to agriculture (alfalfa and lettuce) have decreased from over 70,000 in the early 1950's to less than 10,000 birds in recent years. Pintails increased from less than 10,000 in 1953 to 49,200 in 1970. Since 1970 there has been a downward trend in the number of pintails in the area. The Salton Sea area is the most important wintering area in the state for ruddy ducks, with 46 percent of the statewide mid winter population.

At the south end of the Salton Sea the Department of Fish and Game operates the Imperial Wildlife Area consisting of the Wister Unit (5,243 acres), the Finney-Ramer Unit (2,047 acres), and the Hazzard Unit (535 acres), which is leased to the U.S. Fish and Wildlife Service. The U.S. Fish and Wildlife Service operates the Salton Sea NWR, the major portion of which has been inundated by the rise in the water level of the Salton Sea. Private wetlands occur at both ends of the Sea. In the Coachella Valley all of the managed wetlands are in private ownership where there were 22 duck clubs in 1979 (1,399 acres wetlands). Most of the clubs use artesian wells for water for flooding; some obtain water from the Coachella Valley Irrigation District. In the Imperial Valley 31 duck clubs flood 1969 acres for waterfowl, and obtain their water from the Imperial Irrigation District.

Use of grain to attract waterfowl on private duck clubs was begun in 1953 in an effort to help reduce depredation of neighboring crops. The USFWS put grain out for waterfowl on the Salton Sea NWR from 1947 to 1978. Permits for waterfowl feeding were issued by the DFG during the 1981-82 waterfowl season to 17 private clubs in the Coachella Valley and 15 clubs in the Imperial Valley, for a total of 2,532 acres.



## VI. THREATS TO WETLANDS AND WATERFOWL

### A. Public Wetlands

The major threats that are anticipated on the present State and Federally owned wetlands are diminishing water supplies and inadequate operation and maintenance funding levels.

### B. Private Wetlands

The major threat to privately owned wetlands is conversion to other land use. The loss of wetlands important to waterfowl during the last half century and anticipated future losses have and will continue to occur on private wetlands owned and maintained for waterfowl hunting. It is on these privately owned wetlands that a major effort is needed to maintain and improve existing habitat.

How much of these wetlands we can continue to lose without affecting the Pacific Flyway waterfowl population size and distribution is unknown. Essentially all of the privately-owned wetlands in the Central Valley are maintained for the purpose of hunting waterfowl. The private wetland owners are finding it increasingly difficult to keep up with the increased costs of operation and management. Many clubs have attempted to offset these costs by increasing the number of members and shooting more days per week. This approach has generally been self-defeating. Increased hunting pressure reduces hunting quality and as the quality of hunting declines, so does the value of the wetland for wintering waterfowl. Another method used to defray operational cost particularly in the Colusa Basin and Butte Sink is to convert all or part of the club from a managed wetland to rice production which the members can flood and hunt after harvesting. This practice not only reduces the value for waterfowl and other wildlife but also reduces the quality of hunting. Livestock grazing is also used by some clubs to generate income but may reduce the habitat value for waterfowl, a condition not uncommon in the lower San Joaquin Valley. It is inevitable that additional wetlands will be converted to agriculture by owners who are operating marginal clubs or who cannot resist the economic returns of agricultural production.

### C. Agricultural Crops Utilized by Waterfowl

Because rice and other cereal grains have replaced natural foods for some species of waterfowl particularly for pintails and mallards, it is essential to ensure the continued availability of these food sources.

The acreage of rice planted in the State is not anticipated to decrease substantially by the year 2000. The trend in harvesting machinery is toward higher ground speeds and fewer breakdowns, i.e., axial flow harvesters, which will continue to pass approximately 5% of the rice through the harvester (U.C. Ag. Extension Service pers. comm.). The trends in plant genetics include faster maturing varieties, and shorter stature plants to reduce that quantity of combustibles and produce higher grain yields. Cultural changes projected are an increased use of laser ground leveling to reduce the quantity of water needed to grow rice.

These trends should not have a substantial impact on the availability of rice residues for waterfowl except on those lands suitable for second cropping, provided the grower can get the rice harvested, burn off the stubble and work up the ground for the second crop before the winter rains.

#### D. Water For Wetlands

Water use for all purposes in California is rapidly reaching the limit of available supplies. Water resource allocation and conservation of existing supplies is essential and of high priority. Unless provisions are made to designate water for wetlands use in parity with other beneficial uses, the existing sources of water for our interior managed wetlands may be lost.

This threat to existing water supplies is very real. The twelve state and federal waterfowl management areas in the Sacramento and San Joaquin Valleys total 75,000 acres. These areas use 283,800 acre/feet of water annually for their current management. Of this total 96,200 acre/feet are considered to be a firm supply; that is, surface water under contract, pumped groundwater with a safe yield or drain water which was available during the drought of 1976-77. On the other hand, 66% of the current water used is either delivered on an "if and when available" basis, or as drainage water subject to onfarm conservation or as over-drafted groundwater. About 50,000 acres of publicly owned wetland habitat depend upon tenuous water supplies.

The same twelve areas in the Central Valley, mentioned above, used 4.5 million kilowatt hours of electrical energy in 1981. Total demand was 2,223 KW. Estimates are that costs will double by the year 2000 despite conservation efforts. All power is purchased from private utilities.

The long-term availability of water for existing privately owned wetlands is less well known. It is almost impossible to sort out the myriad of water resources used by private duck clubs. It is believed that the water supply for these areas is more secure than that described for the public lands based on owners responses to our questionnaire. However, one-third to one-half of their water could be lost to agricultural conservation practices or competition for available supplies.

A related problem is the high cost of power required to pump groundwater and to transport water to and within the state and federal waterfowl management areas.

#### E. Research Needs

The Department is currently unable to conduct all the research necessary to assure optimal management of the wetlands remaining in the state due to the limited funds available from existing sources.

## VII. PROPOSED PROGRAM FOR WETLANDS AND WATERFOWL

### A. Conservation Easements to Protect Existing Private Wetlands

Perpetual wetland conservation easements are believed to be the best method of preserving private wetlands. The acquisition of conservation easements entails the purchase of development rights and the requirement that the lands be maintained as wetlands. Easements are less expensive to acquire than fee title. The Department would not assume operational costs, the land would remain in private ownership, and the value for waterfowl would be preserved in perpetuity or until it is mutually agreed upon by the Fish and Game Commission and the owner that continued maintenance as a wetland is not in the best public interest. A management plan submitted by the owner and approved by the Department of Fish and Game must be a condition of the easement. These management plans would assure that the area provide adequate public benefits to justify the expenditure of public funds and in many instances would improve the quality of hunting for the owners.

It is recommended that tax incentives be adopted to encourage private landowners to sell easements to the State and to provide some compensation for the added cost of improved management. Some of the incentives that should be considered are; the income from sale of wetland easements should be exempt from taxable income; legislature could exempt property taxes for real property under a wetland easement; water for wetlands under an easement could be transported at no cost in the State Water Resources Development System.

The recommended State wetland easement program would compliment and not duplicate the Federal program which has never been funded at a level to adequately protect enough private wetlands in California. The Federal government should be encouraged to strengthen their program.

### B. Water for Waterfowl and Wetlands

The most promising new sources of water include new reservoir projects under study, the use of saline agricultural wastewater in the San Joaquin and Imperial valleys and municipal wastewater in coastal areas. For example, the San Joaquin Valley Interagency Drainage Program for Agricultural Drainage and Salt Management in the San Joaquin Valley (U.S. Bureau of Reclamation, California Department of Water Resources and State Water Resources Control Board) identified as much as 600,000 acre feet of brackish water which could support as much as 65,000 acres of brackish water marshland. The program proposes a series of marshes along the length of the San Joaquin Master Drain which will be managed to optimize their value for waterfowl. The benefits of this proposed program are widespread. In addition to marshland habitat, there would be water quality benefits, substantial agricultural benefits and a significant cost savings over alternative solutions to the agricultural drainage problem.

The total acreage of wetlands which could be created with agricultural drain water in the Imperial Valley is uncertain. The problems and

opportunities surrounding wetland habitat in the Salton Sea area are very complex. The Salton Sea is a designated agricultural sump and as such is the repository of substantial amounts of drainage water. Over the years the volume discharged to the Sea has exceeded evaporation and the level of the Sea has risen. Agricultural land and public wetlands have been inundated and lost. Private lawsuits and actions to require water conservation by the Department of Water Resources will reduce the inflow to the Sea and its level is expected to drop.

Unfortunately, the reduced drainage flow, coupled with pressure to divert flow to the Salton Sea from the New and Alamo rivers, has increased the salinity of the Sea. As the present rate of salinity increase, the fishery of the Salton Sea is threatened. The California Fish and Game Commission has called for a multi-agency task force to prepare a water management program which would stabilize the Salton Sea salinity and water level at a point which will sustain the existing fishery and allow for the reclamation of wetland habitat. It is estimated that as much as 30,000 acres of wetlands could be established and supported by agricultural drainage water.

The water supplies for state and federal owned wetland habitats in the Central Valley are being studied by the Bureau of Reclamation with the assistance of the DFG and U.S Fish and Wildlife Service for the purpose of securing adequate supplies. It is not known when the Bureau's recommendations will be submitted to Congress. Appropriate recommendations requiring action by the State Legislature will be submitted to that body following Department review.

Currently an enlargement of Shasta Reservoir has the greatest potential for providing new fresh water supplies for new and existing wetlands. The California Department of Water Resources and the U.S. Bureau of Reclamation are conducting an appraisal study for an Enlarged Shasta Project. An enlarged Shasta may have adverse effects on wetland in the Butte Sink which must be mitigated or compensated. The allocation of a small fraction of the total yield of this project after mitigation responsibilities are met, could support a significant acreage of new wetlands and provide firm water supplies for existing wetlands. To obtain freshwater for wetlands the Legislature should authorize the Department of Fish and Game to participate fully in the planning and allocation process for this and other future state and federal projects including Cottonwood Reservoir.

The Bureau of Reclamation's proposed Allen Camp Reservoir in Modoc County is designed to supply water to a proposed 11,000 acre national wildlife area. The Bureau of Reclamation also included water for Central Valley national wildlife refuges in their proposal for legislation to reauthorize the Central Valley Project.

Relatively large, shallow ground water recharge ponds offer a potential source of new wetlands of substantial magnitude. A partial list of 48 water agencies who utilize recharge ponds or basins indicate that they use 24,000 acres of shallow ponds throughout a major part of the state. The total acreage of recharge ponds in existence today and planned for

the future has not been determined. Nor has it been determined how many acres of existing and planned recharge ponds constitute potential new marshlands.

Groundwater recharge basins consist of streambeds, flood plains or other relatively low-lying areas where soil permeability allows the rapid percolation of surface water into underground aquifers. There are 357 identified groundwater basins in California with a total capacity of about 1.3 billion acre-feet of water. Approximately 143 million acre-feet of this total is usable and provides over 40 percent of the applied water needs of the State, an amount which exceeds 5 million acre-feet annually.

The natural replenishment of heavily used basins near major metropolitan and agricultural areas is often augmented through the use of either man-made or improved natural recharge basins. These managed basins are usually in excess of 100 acres in size and are flooded periodically with water from local reservoirs or imported from more distant sources. The major sources of imported water used in recharging depleted basins are the Sacramento River system via the California Aqueduct, the San Joaquin River system and the Colorado River via the Colorado River Aqueduct and the All American Canal.

The development of quality marsh habitat in recharge ponds and basins is entirely dependent upon the timing and duration of pond flooding and maintenance practices. Most groundwater recharging takes place during the winter and spring when surface water is most available. Some summer flooding occurs in those basins which are recharged artificially with imported water. Maintenance practices are largely dictated by the rate of silt deposition in the ponds. Recharge ponds which are flooded with water containing a heavy silt load are often scraped annually to retain an adequate level of permeability. Other ponds with highly permeable soils and relatively clear water need be scraped less often. This latter condition provides the best opportunity for optimum marsh habitat development.

Funding is needed for the Department to begin an intensified effort to determine the full potential of creating new marshlands on existing and future groundwater recharge ponds. This investigation will: 1) inventory all present and future recharge sites, evaluate the potential of each site; 2) review existing maintenance practices and develop alternative pond management techniques consistent with both marsh development and efficient recharge; and 3) devise various incentives to encourage water agencies to engage in marsh development.

The installed capacity of the power resources of the Central Valley Project is 1.7 million kilowatts; in 1980, the Central Valley Project delivered 8.6 billion kilowatt hours. The generation of this power, with its great benefits to California and the nation, has had substantial adverse impacts to fish and wildlife, including wetland habitat. It would therefore be appropriate to make Central Valley Project power available for the management of those waterfowl areas to partially offset the losses caused by the Project's construction and operation. This

would require reauthorization of the Central Valley Project and could be accomplished with the request for upgrading of existing water contracts.

C. Protecting Agricultural Waste Grain for Waterfowl

Waterfowl could be assured a continuing source of food, primarily rice and corn if growers who reflood after the harvest to provide waterfowl habitat were given first priority for fall burning permits. Waterfowl hunting privileges could then be sold to provide economic benefits to the owner. In some areas changes in the current water delivery and maintenance schedules of water districts would have to be made. Deliveries would need to continue through mid-January; this would require the Districts to wait until the February-April period for annual maintenance.

Although the value to waterfowl is not as great as flooded rice fields, certain species of ducks and geese make extensive use of unflooded rice fields. To protect the values of these fields, a secondary level of priority for burn permits should also be given to growers who agree to leave their rice fields unplowed until the middle of March.

D. Using Wastewater to Create Wetlands

An interagency board with a technical advisory committee could be established by the Resources Agency to assist sanitation districts with the creation of new wetlands using treated wastewater. Membership of the Board could include the Departments of Fish and Game, Health Services and the State Water Resources Control Board. Grants and/or interest free loans should be available for sanitation districts to use for acquisition and/or development of land to create new wetlands. Management of wastewater wetlands should optimize waterfowl value consistent with mosquito control and the primary purpose of nutrient stripping.

E. Accelerated Wetland and Waterfowl Research

To improve the Department's ability to optimize the value of existing wetlands and to enhance the development of new wetlands for waterfowl, an accelerated research project utilizing new technologies should be funded. Topics for investigation should include evaluation of 1) marsh management methods to improve existing and create new wetlands; 2) waterfowl food habits and energetics; 3) disease control; 4) nesting success and predation; 5) efficient use of available water supplies and 6) the response of waterfowl to varying environmental conditions.



## VIII. NEW FUNDING

If the State of California is going to protect, enhance and increase its wetlands for the wintering waterfowl of the Pacific Flyway, substantial amounts of funds will have to be made available from sources other than the traditional Department of Fish and Game sources. The high cost of wetland protection measures recommended for increasing and preserving wetlands for waterfowl has prevented implementation. The traditional method of protecting natural systems by regulating use, does not apply to protection of California's interior modified wetlands. These wetlands are not natural systems and require the expenditure of considerable amounts of money annually for operation and maintenance. Operation and maintenance costs on the Department of Fish and Game's six major wildlife areas that provide wintering waterfowl habitat, averaged \$55 per acre for the 1981-82 fiscal year. By comparison, a survey conducted by the Suisun Resource District in 1978 determined that on the private lands in the Suisun Marsh, an acceptable level of habitat management cost approximately \$30 per acre; an optimum level of management is \$45 per acre. However, owners in this area do not pay for water delivery or for power for pumping since water is obtained from sloughs utilizing tide gates. Therefore, cost elsewhere can be higher depending on water delivery charges or depth of groundwater.

### Private Wetland Protection

There are approximately 200,000 acres of private duck clubs containing modified natural wetlands remaining in California, of that total about 100,000 acres may be suitable for inclusion in a State Conservation Easement Program. These are areas with adequate water available through the year 2000, not included in the federal wetlands easement, or threatened with conversion to other land uses. Assuming conservation easements can be acquired at 50 percent of fee value and the average private wetland fair market value of \$2,000 per acre, the acquisition cost would amount to \$100 million. The cost to the State to reimburse the counties for property taxes lost on lands under state assessment would amount to \$1,560,000 per year or \$22.5 million total through the year 2000.

It is estimated that a total of \$122.5 million is needed to implement the recommendations for protection of private wetlands in this Plan. The funding could be generated by \$10 million annual appropriation for 15 years from the Energy and Resource Fund or the General Fund.

### Public Wetland Operation

To increase the amount of wetlands by 50 percent will require acquisition of 120,000 acres at an estimated cost of \$2,000 per acre and an average of \$1,000 per acre for development for a total of \$3,000 per acre or \$360 million. The funding could be generated by a \$24 million a year appropriation from the General Fund or from the Energy and Resources Fund or a bond act for the entire amount. These amounts could be substantially reduced through development of new wetlands with other public works projects. See list of Second Priority New Wetlands, Page 49.

Additional funds are needed for the operational cost of any new public wetlands acquired and developed by the Department. Presently, 50 percent of the Department's wildlife management, game species improvement and preservation

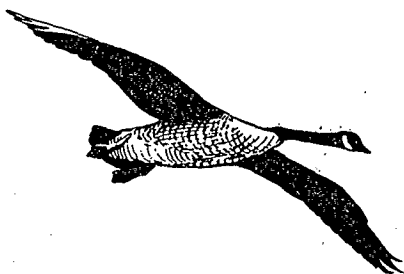


budget is spent on waterfowl and wetland associated species, primarily for the operation of wildlife areas. A substantial increase in the acres of wetlands managed by the Department will require new funds as the Department cannot reduce other programs to operate new wetland areas.

Additional modified natural wetlands could be operated by the Department by increased user charges. One of the three objectives for management of existing waterfowl habitats is to relieve crop depredation, yet the agricultural industry is not contributing to this operation. It is recommended that an annual appropriation from the General Fund of one million dollars be made to the Fish and Game Preservation Fund to pay for this benefit.

There is also extensive use of the wildlife areas for non-appropriative use. Currently only the appropriative users pay for the operation of these areas through their license fees, taxes on arms and ammunition; for waterfowl and pheasant hunters a daily or seasonal entrance fee is also collected. This inequity could be corrected with legislation that makes General Fund appropriations to the Fish and Game Preservation Fund based on the ratio of nonappropriative users to appropriative users visiting waterfowl areas. Based on 1981-82 fiscal year when 41 percent of the total use of these areas was non-appropriative users and the total operating budget was \$3.42 million, the Fish and Game Preservation Fund would receive \$1.4 million in General Fund subsidy.

A fraction of a cent increase in sales tax similar to the State of Missouri's would generate adequate funds to implement the entire wetlands program and provide a firm funding base for the Department's Rare and Endangered Wildlife Program, if approved by the voters. The actual amount of the increase would have to be calculated by the Board of Equalization depending on the level of implementation of this plan the Legislature desired. This source of funding would provide ongoing funds for operations and maintenance not possible from Bond Acts and if set at a rate high enough could also provide funding for acquisition, thereby eliminating the need for a General Obligation Bond Act. If this method were chosen, there would also no longer be a need for annual appropriations to cover the benefits to nonappropriative users and agriculture.



## IX. NEW WETLANDS

Creation of new wetlands could provide many benefits if they are properly managed. They could reduce the dependency of wintering waterfowl upon agriculture for food; they would provide additional recreational hunting and non-hunting opportunities; they would provide habitat for other wildlife and benefits such as open space, oxygen production and improved water quality. Fortunately, waterfowl are highly mobile and opportunistic and rapidly pioneer and use new habitats; this makes development of new wetlands plausible wherever water supplies and suitable soils are available.

### Public Health Concerns Associated with Wetland Development

Shallow static water with emerging and submerged vegetation provides habitats suitable for mosquito propagation during the warm months of the year. The use of wastewater in wetlands would have an additional amplifying influence on the aquatic stages of the mosquito life cycle.

Mosquito control agencies need to play a major role in the planning and design of wetland projects. They should be contacted early in the process so that mosquito prevention standards and integrated control techniques can be incorporated into the basic design and operation of a wetland system.

The pintail is one of the most sought after ducks in California, and many of the private wetlands are being managed primarily for wintering populations of this species. The pintail population, however, is subject to substantial cyclic fluctuations in the numbers of birds wintering in the State. Fluctuations are the result of conditions on the breeding grounds, primarily the pothole country in the Canadian prairies. Drought in that area severely depresses the production of pintails such as occurred in 1980, 1982 and 1983 when the population decreased 31 percent from the ten-year average. When hunting success drops due to fewer birds and a higher percentage of older smarter birds, duck club owners become dissatisfied and the loss of wetlands is accelerated. Maintenance of huntable populations of waterfowl with reasonable hunting opportunities is essential if private wetland owners are to continue to maintain the existing wetlands or invest in developing new wetlands.

In addition to increasing wintering habitat, consideration should be given to developing wetlands with potential for increasing breeding habitat. California produces the majority of the mallard ducks it harvests, and annually produces 3 to 4 percent of all ducks in the flyway and 20,000 Canada geese. Increased production of mallards in the State would help maintain acceptable hunting success when droughts on the Canadian prairies depress the pintail population. With the accelerated destruction of wetlands in the Canadian provinces, it appears desirable to place increased emphasis on local waterfowl production projects.

## Public

The least costly means of increasing the acreage of wetlands in public ownership are to (1) enlarge existing areas, and (2) develop new wetlands in conjunction with other public projects.

The enlargement of existing wildlife areas can be accomplished with a minimum of additional personnel and equipment, the major expense being the purchase of land and water supplies. Purchases will be made on an opportunity basis, subject to the availability of funds and willing sellers.

Development of new wetlands in conjunction with other public projects would include: (1) marshes proposed in conjunction with the San Joaquin Drain Project; (2) an integrated project to resolve the increasing problems of the Salton Sea, (3) utilization of municipal and industrial wastewater pending favorable results from current experimental projects, and (4) mitigation and enhancement features of federal water projects, e.g., U.S. Corp Engineers, Cache Creek, Putah Creek and Cottonwood Dam Projects and the Bureau of Reclamation Allen Camp Reservoir Project and an enlarged Shasta Dam.

All new and existing wetlands the Department restores, develops or operates will be managed to produce optimum consumptive and non-consumptive wildlife oriented recreational uses compatible with the maintenance of a productive wetland environment.

## Private

It is anticipated that some marginal agricultural lands will be converted to modified natural wetlands by private duck clubs if the suggested tax incentives and funding proposals are adopted. Initially the increases are expected to occur on lands owned by duck clubs that are farmed for rice and reflooded for hunting after harvesting. Responses to the private wetlands questionnaire indicate that there is enough demand for waterfowl hunting to support the development of additional duck clubs in response to a reduction in operational costs. It is probable that the new wetlands would be established on poorer soils where agricultural production is marginal.

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POTENTIAL NEW WETLANDS  
FOR  
DEPARTMENT OF FISH AND GAME ACQUISITION AND/OR DEVELOPMENT

First Priority - Enlarging Existing Areas (Within first priority acquisition group areas are not listed in order of priority)

		<u>Potential Added Acreage</u>
Region 1:		
Lake Earl/Talawa WA		2,500 Acres
Honey Lake WA		8,500 "
Region 2:		
Lower Sherman Island WA		1,900 "
Gray Lodge WA		1,000 "
Region 3:		
Petaluma Marsh WA		1,500 "
Napa Marsh (Salt Pond Restoration)		20,000 "
Bair Island ER		unk
Elkhorn Slough ER		550 "
Hill Slough WA		800 "
Grizzly Island WA		4,500 "
Suisun Marsh (Mitigation)		1,000 "
Region 4:		
Los Banos WA		1,200 "
Mendota WA		2,600 "
Region 5:		
Imperial WA (Included in Imp. Val. Int. Water Program)		
Upper Newport Bay ER		10 Acres
Bolsa Chica ER		200 "
San Jacinto WA (Securing a Water Source		1,000 "
Sub-Total		<u>47,260</u> "
Second Priority - New Wetlands Development in Conjunction With Other Public Projects (Within second priority acquisition group areas are not listed in order of priority)		
		<u>Potential Total Acreage</u>
San Joaquin Valley Agricultural Drain Project		64,000
Imperial Valley Integrated Water Program		30,000
San Francisco Bay Waste Water Reuse		30,000
Big Valley, Modoc County (if Allen Camp Dam is Constructed)		11,600
Paiute Marsh, Los Angeles Sanitation District (Subject to U.S. Air Force Approval)		1,000
Cache Creek Basin Project, Yolo County (U.S. Corps of Engineers)		3,600
Beach Lake, Sacramento County (USCE Morrison Creek Flood Control Project)		4,000
Mammoth County Waste Water District Disposal Marsh		18
Modoc National Forest (includes Nesting Islands)		10,275
Thermalito After Bay DWR		<u>1,000</u>
Sub-Total		155,493

Third Priority - New Wetland Acquisition and/or Development (Within third  
priority acquisition group areas are not in order of priority)

	Potential	Total	Acreage
Smith River Delta, Del Norte County	6,000		Acres
Hunter/Salt Creek, " "	200		"
Crescent City Marsh, " "	160		"
Humboldt Bay Area, Humboldt County	15,000		"
Lindsay Creek Area, " "	1,200		"
Eel River Delta, " "	21,000		"
Dixie Valley, Lassen County	2,500		"
Badger Creek-Laguna Creek-Consumnes River Flood Plain, Sac. Co.	6,000		"
Best Slough, Yuba County	2,200		"
Buttonwillow Slough, Madera County	478		"
San Joaquin Marsh, Orange County	200		"
Santa Ana River, Orange County	150		"
Prado Basin, Riverside County	200		"
Huntington Beach, Orange County	35		"
Sutter Bypass, Sutter County	10,880		"
Olive Hill-Honcut, Yuba County	2,870		"
Sub-Total	69,073		"
Grand Total	271,826		"

## X. ADDITIONAL OPTIONS AND CONSIDERATIONS

The following were considered but believed not appropriate at this time. Should conditions change in the future, they may become feasible and should be reconsidered.

### A. Actions to reduce the projected loss of private wetlands

1. Solicit donations of permanent conservation easements to the State from private wetland owners.

The potential for success of this action is very limited. The Federal Government's Protect Our Wetlands and Duck Resources (POWDR), request for donations of wetland easements to the Department of Interior has not been productive in California to date. The loss of the option to obtain revenues from wetlands or to alter land use patterns would make donation of easements from a significant segment of private wetlands unlikely.

2. Donation of 10 year easements to the State with a one year extension each year until owner indicates a desire to terminate. Owner's property taxes are paid by State. If cancelled the owner would repay the State for property taxes that would have been assessed during last 10 years of contract.

The main disadvantage of this option is the wetland protection would not be permanent. The lure of profits that could be made from conversion to agriculture or more intensive land uses could still encourage termination of contracts and conversion to other uses at the end of the easement period.

3. Purchase all the wetland habitats needed to support the wintering waterfowl by the State and Federal Governments.

This section would be costly for government to attempt, with over 300,000 areas of the habitat currently in private ownership. Not only the initial cost but ongoing cost of operation and management would be prohibitive. Private interests are doing a good job of managing wetlands. Also the management of wetlands by private duck clubs is a beneficial value that should be maintained. From a conceptual view it would be inappropriate for government to take over private management of wetlands that are being adequately managed at private expense.

4. Enact zoning legislation preventing conversion of the duck clubs to agriculture.

Private wetland owners would be expected to oppose this recommendation as it would remove their options for other land uses. Most private wetland habitat is not a self-sustaining natural system that can be protected by preclusion of other uses. These man-made

habitats require continuing attention in the form of operation and maintenance to support waterfowl and other wildlife. The cost of such efforts are considerable, often exceeding \$50 per acre. Even if zoned as wetland, without adequate incentives to continue to spend the money necessary for upkeep and operation these areas could revert back to upland habitat of little value to waterfowl. Counties would likely be in opposition to a state zoning system.

5. Purchase of private wetlands by State and leased back to private duck clubs.

The acquisition cost of this option would at least double the easement program recommended. In addition, there would be substantial expenses incurred with administration of bidding procedures and other property management activities. It is unlikely that lease fees could be high enough to recover cost to State. Also there is an unresolved question about the propriety of use of state funds for acquisition; after lease-back the public would not be able to use state owned lands.

B. Acquisition and development of new wetlands

1. Use of eminent domain to acquire lands for new wetlands. Land acquisition by condemnation results in higher acquisition costs than the recommendation of purchase from willing sellers. Since 1955 when the Department was involved in condemnation proceedings at Gray Lodge Wildlife Area, it has been Department of Fish and Game policy not to use eminent domain for land acquisition. In practically all instances state ownership of appropriate wetlands can be obtained from willing sellers.

C. Funding for operation and maintenance of state owned wetlands

1. Establish a tax on rice growers to help pay for the benefits they receive from the operation of wildlife areas in preventing crop depredation.

Seeking payment for these benefits after thirty years of providing them free would not be acceptable to the agricultural interests which provided the major support for initial acquisition of wetland waterfowl habitats. Proposing any additional burden on rice growers particularly during periods of declining market would be unrealistic.

2. Increase cost of hunting license.

Previously recommended methods of charging wildlife areas users are more equitable. Cost of hunting licenses have increased 200% in recent years. Further increase for wetlands program not realistic. Currently over fifty percent of the wildlife game species funds are spent on the management of the Department's wetlands and waterfowl. Only one quarter of the hunters hunt waterfowl. Additionally

increasing the allocation of funds for wetlands would adversely affect other important wildlife programs.

3. Increase the State Duck Stamp fee with the increase to be used for O & M of state-owned wetlands.

Hunters are already paying essentially the entire cost of operating state-owned wetlands and this additional cost is not warranted.

4. Increase fees for hunting waterfowl on state-operated areas to pay a portion of the cost of maintaining wetlands. The current charge is limited to cost of operating the hunting program.

See reason for not recommending C.3.

D. Funding wetland program elements of easements on private wetlands, purchasing, development, operation and maintenance of State wetlands.

1. Income tax check off.

This source of revenue has been used in 20 other states in the United States for funding nongame programs and has been enacted by the legislature for rare/endangered funding in California beginning with the 1983 tax year. Based on current projections, not enough money can be generated from this source for both wetland and rare/endangered programs.

2. Place a general obligation bond act before the voters.

A continuing source of funds is needed for these programs. Bond act funds can not be used for operation and maintenance. The current interest rates also make it difficult for the State to sell bonds.

3. Place an interest free, wetlands loan act initiative before the voters to be paid back from California Duck Stamp funds beginning with the year 2000.

The California Waterfowl Association rejected this concept to pay back general fund. The primary reason is that wetlands benefit all citizens and not just the duck stamp buyer.



APPENDIX A

Senate Concurrent Resolution No. 28

RESOLUTION CHAPTER 92

Senate Concurrent Resolution No. 28 - Relative to wetlands.

(Filed with Secretary of State September 13, 1979)

LEGISLATIVE COUNSEL'S DIGEST

SCR 28, Keene. Wetlands.

This measure would request the Department of Fish and Game to propose a specified plan regarding the protection, preservation, restoration, acquisition, and management of wetlands, and to submit such plan to the Legislature not later than January 1, 1983.

WHEREAS, Over 90 percent of the historical natural wetlands in California have been lost by the conversion to other land uses; and

WHEREAS, Those wetlands remaining provide critically important habitat for a wide variety of wildlife and thereby provide an important benefit to the people of the state; and

WHEREAS, The state and federal wildlife agencies have determined that loss of wetland habitat and, particularly, waterfowl wintering habitat, have had a severe adverse effect on the number of waterfowl on the Pacific Flyway; and

WHEREAS, If this trend were to continue, the future of the Pacific Flyway waterfowl population would be threatened; and

WHEREAS, It is the intent of the Legislature to preserve, protect, restore, and enhance California's wetlands and the multiple resources which depend upon them for the benefit of the people of the state; now, therefore, be it

RESOLVED BY THE SENATE OF THE STATE OF CALIFORNIA, THE ASSEMBLY THEREOF CONCURRING, That the Department of Fish and Game prepare a plan which will identify means by which existing wetlands can be protected from conversion to other land uses and be managed in such a manner as to optimize their value as waterfowl habitat, former wetlands can be restored to wetland status and new wetlands created, and additional recreational benefits can be provided on existing, restored, or newly-developed wetlands; and be it further

RESOLVED, That the plan shall include, but not be limited to, the following subjects:

- (1) A program for maintaining existing wetlands habitat,
- (2) A program for optimizing wildlife value of existing wetlands habitat,
- (3) The identification of sufficient additional potential wetland habitat sites to increase the amount of wetlands in California by 50 percent and a program for the public and private acquisition of such lands.
- (4) Potential sources of water to assure an adequate water supply for existing and newly-created wetlands.
- (5) An expanded recreation program for existing and newly-created wetlands,
- (6) Potential sources of funding to implement its plan, and
- (7) Such other measures as the Department of Fish and Game deems to be necessary and appropriate to implement the plan by the year 2000; and be it further

RESOLVED, That the Department of Fish and Game submit such plan to the Legislature not later than January 1, 1983; and be it further

RESOLVED, That the Secretary of the Senate transmit a copy of this resolution to the Director of Fish and Game.

## APPENDIX B

### WETLAND TASK FORCE

<u>Organization</u>	<u>Member</u>
Department of Water Resources	Robert Potter
Bureau of Reclamation	Lauren Scott
Water Resources Control Board	Tom Inouye
U.S. Soil Conservation Service	Ronald Schultz
Department of Health Services	Don Womeldorf
U.S. Fish and Wildlife Service	Felix Smith
Wildlife Conservation Board	John Schmidt
Cooperative Extension Service	Lee Fitzhugh
California Waterfowl Association	Daniel Chapin
Waterfowl Habitat Owners Alliance	Mike Maier



## APPENDIX C

### SAMPLE LEGISLATION

#### CALIFORNIA WETLANDS PROTECTION ACT

##### 1. Legislative Findings and Declaration

The Legislature finds and declares that:

- (a) The estimated 4.5 million acres of natural wetlands which once supported extensive populations of resident and migratory wildlife in the inland areas of California have virtually all been eliminated during the settling and development of the state. Coastal wetlands have similarly suffered approximately a three-quarter reduction.
- (b) Wetlands provide numerous benefits to the people of California by furnishing essential habitat for a wide variety of wildlife particularly wintering waterfowl, open space, ground water recharge, flood water dissipation, water quality benefits, oxygen production and recreational opportunities.
- (c) The loss of natural wetlands has forced waterfowl and other marsh associated wildlife to use a dwindling supply of modified natural wetlands, developed and maintained at considerable expense by public and private interests and on suitable agricultural lands which are utilized for food.
- (d) The maintenance of over 60 percent of the total wetlands in the state by the private sector has substantial public benefits yet the high costs associated with maintaining these areas is resulting in the conversion of wetlands to other uses, principally agriculture.
- (e) Increased investments in public and private wetlands are necessary if their values are to be preserved for future generations. Existing wetlands need to be improved and new wetlands created or restored.
- (f) Failure to make these investments will result in decreases in wildlife abundance and diversity, reduced recreational opportunities, increase agricultural depredation and a deterioration in esthetic values of the state.

##### 2. Purposes

The purposes of this chapter is to encourage private and public investments in, and improve the management of, wetlands within the State to ensure their future benefits to wintering waterfowl and associated resident and migratory wildlife, thereby preserving the benefits of wetlands for the present and future generations of citizens of the state. The primary emphasis of the program established by this chapter shall be to preserve and enhance existing wetlands optimizing their value to wintering waterfowl and to create new wetlands to the extent compatible with other social, economic and resource needs.

### 3. Funding

In furtherance of the purposes of this chapter, there shall be paid annually to the Wildlife Restoration Fund to be maintained in a special account therein the sum of ten million dollars (\$10,000,000) to be used by the Wildlife Conservation Board for the purpose of protecting, preserving, restoring, acquiring and managing wetland habitat important to wintering waterfowl. The appropriations will be made from the Energy Resources Fund (ERF) as provided in Section 26403(3) of the Public Resources Code or from the General Fund if funds are not available in the ERF. The annual appropriation will continue through the year 2000 and be treated as an advance, without interest, to be repaid beginning with fiscal year 2001 from funds derived from the sale of State Duck Stamps as provided in Section 3701 of the Fish and Game Code.

4. The Wildlife Conservation Law of 1947 (Chapter 4, Fish and Game Code) is hereby amended by the addition of the following sections:

Section 1355. The board may purchase perpetual conservation easements on wetlands subject to terms and conditions as are established by the board. Such terms and conditions shall include a requirement that the property be developed and maintained as a wetland in accordance with a plan approved by the Department of Fish and Game. In setting priorities for purchase of conservation easements the board shall consider the value of the area to wintering waterfowl, the dependability of water supplies and threat of conversion to other land uses.

Section 1356. Fee owners of property subject to a conservation easement pursuant to Section 1355 that is maintained for waterfowl hunting purposes shall have the option to purchase the conservation easement from the state for current fair market value if waterfowl hunting is prohibited, provided, however, if such fee owner purchase of the conservation easement is to clear title of the property for purposes other than continued wetlands management, the State shall have first right of refusal to purchase fee title to the property based on current fair market value.

Section 1358. Any easements or rights granted to the state pursuant to Section 1355 shall include provisions for enforcement by the state of all terms conditions and covenants made by the grantor of such easements or rights. Such enforcement provisions shall include the right of the State to sue for damages for breach of covenant and/or injunction to terminate an activity which violates the terms of the conservation easement and/or for an order requiring specific performance of the terms of the said easement.

Section 1359. All plans approved by the Department pursuant to this Chapter shall include requirements and conditions prescribed by the Fish and Game Commission that assure adequate public benefits are received by the State.

5. The Revenue and Taxation Code is amended by the addition of the following:

Section \_\_\_\_\_. Money received from the sale of a conservation easement under the provisions of Section 1355 of the Fish and Game Code is not considered income for the purposes of this chapter.

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# SIGNIFICANT WATERFOWL WINTERING AREAS ONE THOUSAND ACRES OR GREATER AND STATE AND FEDERAL WATERFOWL AREAS 1982

State - ☐Wildlife Areas & Ecological Reserves  
(W.A.) (E.R.)

- 1 - Butte Valley W.A.
- 6 - Lakes Earl - Talawa W.A.
- 7 - Big Lagoon W. A.
- 9 - Honey Lake W.A.
- 13 - Gray Lodge W.A.
- 16 - Petaluma Marsh W.A.
- 17 - San Pablo Bay W.A. & Napa Marsh E.R.'s
- 18 - Tomales Bay E.R.
- 19 - Grizzly Island & Hill Slough W.A.'s
- 20 - Sherman Island W.A.
- 22 - Bair Island
- 26 - Los Banos W.A.
- 27 - Volta W.A.
- 28 - Elkhorn Slough E.R.
- 30 - Mendota W.A.
- 32-- Pismo Lake E.R.
- 33 - Goleta Slough E.R.
- 35 - Bolsa Chica E.R.
- 36 - Upper Newport Bay E.R.
- 37 - San Jacinto W.A.
- 38 - Buena Vista Lagoon E.R.
- 39 - Batiquitos Lagoon
- 40 - San Elijo Lagoon E.R.
- 41 - San Dieguito Lagoon
- 43 - Imperial W.A.

Federal - ☐National Wildlife Refuges  
(N.W.R.)

- 2 - Lower Klamath N.W.R.
- 3 - Tule Lake N.W.R.
- 4 - Clear Lake N.W.R.
- 5 - Modoc N.W.R.
- 8 - Humboldt Bay N.W.R.
- 10 - Sacramento N.W.R.
- 11 - Delevan N.W.R.
- 12 - Colusa N.W.R.
- 14 - Sutter N.W.R.
- 15 - San Pablo Bay N.W.R.
- 21 - San Francisco Bay N.W.R.
- 23 - Kesterson N.W.R.
- 24 - San Luis N.W.R.
- 25 - Merced N.W.R.
- 29 - Salinas River N.W.R.
- 31 - Kern N.W.R.
- 34 - Seal Beach N.W.R.
- 42 - Tijuana Slough N.W.R.
- 44 - Salton Sea N.W.R.
- 45 - Havasu N.W.R.
- 46 - Cibola N.W.R.
- 47 - Imperial N.W.R.

